

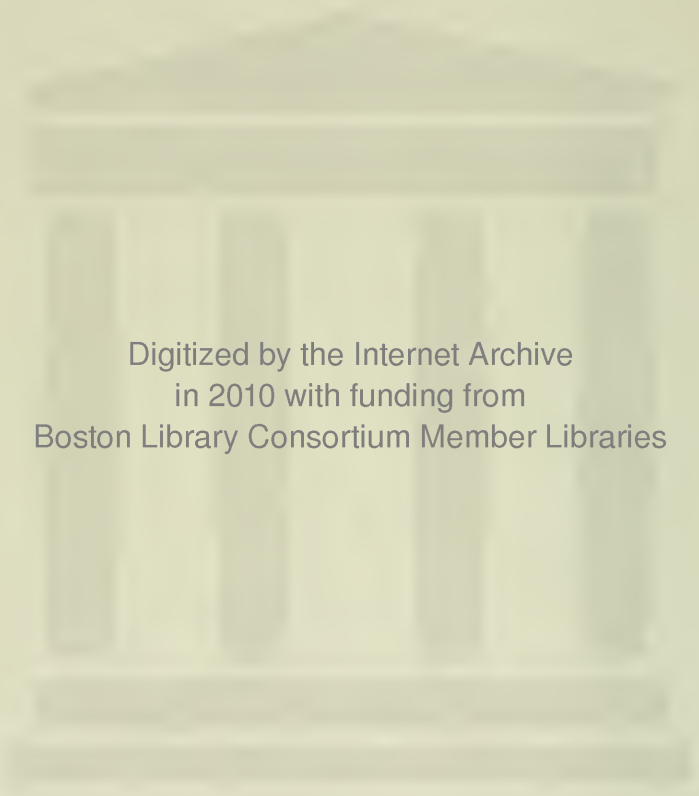
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# SIXTEENTH ANNUAL REPORT

OF THE

## DEPARTMENT OF PUBLIC HEALTH OF MASSACHUSETTS

### REPORT OF THE PUBLIC HEALTH COUNCIL

At the end of the fiscal year closing November 30, 1930, the Department of Public Health was constituted as follows:

Commissioner of Public Health . . . . . GEORGE H. BIGELOW, M.D.

#### PUBLIC HEALTH COUNCIL

GORDON HUTCHINS, 1931	SYLVESTER E. RYAN, M.D., 1931
FRANCIS H. LALLY, M.D., 1933	RICHARD P. STRONG, M.D., 1932
ROGER I. LEE, M.D., 1933	JAMES L. TIGHE, B.A.Sc., C.E., 1932

During the year twelve formal meetings of the Department were held, as well as meetings of the standing committees.

As heretofore, the Committee on Sanitary Engineering, composed of Mr. Tighe, Chairman, Mr. Hutchins and Dr. Bigelow, has met prior to the regular monthly meeting of the Council and submitted its recommendations on all matters of sanitary significance.

Owing to the press of other matters, which made meetings away from the State House impractical, the practice of meeting from time to time at the various institutions was not continued this year. But as it is the opinion of the Council that such meetings are of great value in keeping in touch with these institutions, it is planned to resume this practice next spring. In addition to the studies and reports by the Department, the Council has kept in touch with the legislative study of the pollution of Boston Harbor which has just been completed, and the study in connection with the proposed Mystic River Basin, which is well under way, in both of which our Engineering Division has or is taking an active part; it has held hearings on plans for the protection of public water supplies and the granting of licenses to sell milk, as well as considering plans for sewage disposal, additions to the tuberculosis sanatoria, regulations in regard to the handling of food, and other matters as required by statute; it has approved appointments submitted by the Commissioner; it has revised regulations in regard to milk, shellfish and such other matters as the statutes required and conditions indicated; and it has considered, advised and promulgated policies on the multiplicity of matters within the purview of the Department.

As already mentioned, the Department was designated by Chapter 49 of the Resolves of 1929 to cooperate in a two-year study of the pollution of Boston Harbor. A report on this matter has been submitted. Also, under Chapter 22 of the Resolves of 1930 the Department was directed to cooperate with the Metropolitan District Commission on a two-year study of the problems incident to the creation of a Mystic River Basin. This study is under way.

The Commissioner was designated as a member of special commissions to study the problems incident to habit-forming drugs and to study further the filling of certain portions of Fort Point Channel and South Bay, by Chapters 36 and 29, respectively, of the Resolves of 1930. These two commissions have made their studies and submitted reports.

At a meeting of the Department on January 13, 1931, the Commissioner of Public Health presented to the Council a report of the activities of the Department for the year 1930, and after discussion it was voted that this report, together with the foregoing brief summary of the doings of the Public Health Council, be approved and adopted as the report of the Department of Public Health for the year 1930.

### SIXTEENTH ANNUAL REPORT OF THE COMMISSIONER OF PUBLIC HEALTH

*To the Public Health Council:*

GENTLEMEN: I have the honor to submit herewith my annual report for the fiscal year ending November 30, 1930, although for ease of comparison all figures, except those relating to the budget, will be given for the calendar year.

As usual, I should like to start by pointing out certain matters of outstanding importance or interest in the past year. We are still in a drought of unparalleled magnitude as far back as accurate records are available. A union of towns into the Southern Berkshire Health District has already been accomplished and there is promise that it will soon be followed by a similar union into the Nashoba Health District, including Ayer, Groton, Shirley and the surrounding towns; this having been made practical by the generous assistance of the Commonwealth Fund of New York City. Important investigative and organizational work is made possible for the Department through generous grants from private philanthropies. The Commonwealth Fund is assisting in rural health organization as mentioned above, and more recently funds have been made available from the same source for study of and service for pneumonia. The Rockefeller Foundation has assisted in a statistical and epidemiological study of tuberculosis, in addition to continuing its generous practice of meeting expenses for three or four members of our staff about to undertake new work to visit other places in this country where the particular type of work is being well done. The New England Health Institute was held in Boston in April with a widely expanded program which attracted over 2,000 people. Our studies of chronic disease have culminated in a request that the Legislature grant appropriations for a hospital, clinics and an educational program for rheumatism, which it appears is the outstanding economic chronic disease burden. President Hoover's White House Conference on Child Health and Protection has focused the attention of the country on the resources that should be available for every child, not only in the field of health but also education and the protection of the handicapped. This throws into sharp relief the deplorable lack in our hospitals when of 140 answering a questionnaire, only 55 admit to any prenatal care and 7 state that no breast feeding instruction is given, while 8 are mercifully silent; all of which supports our conviction of the utter lack of even the rudiments of preventive medical consciousness among the vast majority of our hospitals, as was pointed out last year when we found that less than 10 per cent of nurses' training schools were sufficiently interested to let us know whether or not they protected their pupils against typhoid and diphtheria (verily the intellectual isolation of our hospitals is pathological!). The inspection of 175 summer camps showed definite improvement over four years ago in regard to sanitation and the protection of health. With increased assurance in our program against gonorrhea and syphilis, real advance has been made through improved reporting, evidence of the effectiveness of adequate social service and personal contacts in private offices between a member of our staff and some 350 physicians. The soundness of our program for detecting early the children likely to become active cases of pulmonary tuberculosis is emphasized through finding in our follow-up clinics six to eight times as much of this adult type of disease in the children originally showing the childhood type as in the school population at large. To further encourage interest in this work, we are beginning free distribution of tuberculin prepared in our Antitoxin and Vaccine Laboratory. In the interests of further uniformity in local communicable disease, milk and other regulations, we have worked out with a committee of the Massachusetts Association of Boards of Health suitable health regulations for communities of less than 20,000 population, which will be submitted to the Association for approval early in the year. There were two milk-borne septic sore throat outbreaks; one of which was followed by the adoption of reasonable milk regulations, which is another example of Dr. Vaughan's theory of the life-saving effect of epidemics. We may take a little heart, however, that the last two years are the only ones since 1886 without a known milk-borne outbreak of typhoid fever. During the four years since the Legislature authorized the Department to supervise pasteurizing plants, such plants have increased from some 200 to some 600, which vastly complicates the problem of supervision since small plants are much more vulnerable than large ones. In every field we touch, it is impressive, if not discouraging, to have the more thoughtful members of the professions involved in the particular field tell us that the real solution rests in proper postgraduate and undergraduate education; yet from the babel among educators one is not sure whether the situation gets better or worse. In anticipation of an increase in meningococcus meningitis, which fortunately has not materialized, through the cooperation of the Department of Pediatrics at the Harvard Medical School, we



set up a consultative service for this disease similar to that of long standing for infantile paralysis. Influenza and its malignant hysteria were providentially non-existent. Diphtheria was unprecedentedly low here as elsewhere in the country, but interest in active immunization is slowly spreading so that there may be hope of controlling its recrudescence among the generation that must otherwise grow up susceptible. After forty years of professional distinction, Mr. X. H. Goodnough has retired from the position of Chief Engineer of the Department, but fortunately for the Commonwealth his services will be retained in the capacity of consultant. More and more we are impressed as to the unparalleled value of advisory committees for the many new and old problems that we approach, and we have this year used them in such diversified fields as cancer, nutrition, nursing, social service, chronic disease, dental hygiene, public health education, meningitis, and pneumonia, and we shall certainly expand them with our widening program. In newspapers and over the radio we have instituted a weekly Health Forum which we hope to keep away from the banalities of cosmetology which wrecked a somewhat similar venture by the Department over ten years ago. As in other parts of the country, we developed almost over night convulsive interest in psittacosis and jamaica ginger, and we now view with apprehension the extending use of methanol (wood alcohol) as an anti-freeze, both because of its gastro-intestinal and respiratory menace. The fact that none of the four pieces of legislation (on milk, tuberculosis and vaccination) introduced by the Department was passed may mean either that we are too far in advance of public opinion or too far behind, but at least it would seem to indicate that we are not precisely abreast of it, which is perhaps no reflection on us.

### I. GENERAL MATTERS

*District Health Units.* — As has been repeatedly pointed out in these reports, the solution of practically all the difficulties that we meet in adequate health service to the small communities is found in the grouping of towns into health districts. Well and good, but none of them had grouped! Now along comes the Commonwealth Fund of New York City and picks Massachusetts as one of the states in which it will assist in developing rural health service through a full-time adequately-trained staff. This apparently has given us just the added impetus that we needed. Not only does the Fund agree to meet a substantial part of the local budget during the trying period of reorganization (which introduces the inevitably vexing element of withdrawal, which, under the best of circumstances is precarious) but, even more important, it gives us a group of health officer, nurse and inspector whose sole job in a distracting world is to guide, direct, encourage and abet these units. Then, too, a substantial sum is given to our medical schools for undergraduate and post-graduate education for doctors both in and out of the districts. This concrete evidence to the doctors in the units of the advantage to them of the health work is little short of genius. Many a general practitioner when told postprandially of the advantage to him of health work is likely to murmur, "Bologna." And without the support of the substantial part of the medical profession for any health project, permanent success is impossible except in the field of environmental control.

The Southern Berkshire Health District will have the distinction of being the first of its kind in New England if not in the entire country, since elsewhere the county is the unit of organization. This, it appears, will soon be followed by the Nashoba Health District. The success of these two is critical since nothing succeeds like success, and we will promptly start organizing others, until the State is covered by ten or more. But none of the subsequent ones will have the distinction of priority when we get to our Quadricentenary. The time may not be far off when an argument for prolonging the vacation period may be the superior health service that the city dwellers get in their favorite recreation spot, since in Massachusetts at least much of our urban health service leaves a great deal to be desired.

*Uniform Regulations.* — It is better that regulations should be uniform or comparable, rather than standard, since "standard" has acquired a connotation of inflexible conformity which menaces progress. We reported last year that 80 cities and towns had adopted in essence the minimum quarantine regulations recommended two years ago by the Department with the approval of the Massachusetts Association of Boards of Health. The number has now swelled to 100,

leaving about 250 to go. But the health districts will speed many of these under the ropes. Now we are in the throes of drafting a complete set of regulations having to do with sanitation and food inspection as well as quarantine for communities under 20,000, from which we get the most frequent requests for help in this regard. Shortly these will be submitted to the same Association which generously appointed a committee to work with us.

Milk is still vital and vexing. In some areas it has become almost as emotional a fluid as liquor. With the approval of the Division of Animal Industry of the Department of Conservation, which is doing an admirable job in pushing vigorously its tuberculosis eradication campaign among cattle, and the Department of Agriculture, we are still recommending a local regulation requiring that all milk come from non-tuberculous cattle or be pasteurized. (For the sixth consecutive year the Department is introducing legislation to this effect.) This year 22 more communities adopted these regulations or better, one of them following an outbreak of septic sore throat! This brings the total communities so protected to 98, representing 28 per cent of the cities and towns and 78 per cent of the total population of the State. This latter figure is an improvement of 11 per cent over last year.

## II. COMMUNICABLE DISEASES

Again there is the almost fatalistic fluctuation in the number of cases reported to us. Last year we noted a decrease of 16 per cent over 1928 in spite of the month of influenza. This year there is an increase of 17 per cent, landing us about at the 1928 level with a total of 101,204 cases. It is fascinating to speculate what proportion this represents of the actual incidence of reportable disease in the State. Studies indicate that the reporting of scarlet fever and diphtheria is well over 90 per cent (in one community it was 110 per cent!); measles is around 50 per cent; whooping cough probably a little lower; tuberculosis not over 50 per cent; gonorrhea and syphilis probably not over 25 per cent; influenza varying from 0 to over 500 per cent depending upon the hysteria; we know of no way of even approximating the figure for pneumonia. Thus the true figure of incidence of reportable disease would probably be between 200,000 and 300,000, or from 5 to 8 per cent of our total population.

*Tuberculosis. — The Chadwick Clinic Program.* We are in the seventh year of our ten-year program, and the time is growing short in which we can evaluate the work and make definite recommendations as to the perpetuating of the essentials. By the end of the sixth year, last June, we had tested with tuberculin some 150,000 children in the public and parochial schools of the State, and had X-ray films on the chests of about 50,000. In our follow-up clinics, which skim off the positive and suspicious cream, we see children progressing under our very eyes from "suspicious" and "childhood type" to "adult type" of the disease which is so killing at and around puberty. The incidence of open pulmonary tuberculosis in the childhood group is significantly greater than in the child population as a whole, when age correction is made. Only half the parents of children recommended for sanatorium care could be persuaded to allow them to go. In these instances where consent was refused there was frequently a step-parent or evidence of parental incompatibility. In a number of cases where special efforts were made to secure hospitalization the parents even refused to allow the child to continue in the annual follow-up clinic. Thus the social and psychological aspects of the problem are apparent.

Last year we were able to offer the clinic service in the high schools. Here is the age when the tuberculosis death rate rises critically, particularly in girls. The percentage of reactors doubles over the grade schools. Pulmonary tuberculosis is six times as frequent; yet consents for examination are particularly difficult to obtain. In the grade schools, generally, we have only the parents to persuade, but in the high schools the pupils also have their own ideas. While these may well be better than ours, they frequently impede the progress of the program. A woman physician added this year to our group will, we hope, help somewhat in this regard.

Last year the Chadwick Clinics went again, after a lapse of five years, into Springfield, Chicopee, Holyoke and several other communities. The comparative data is being drawn off and should prove most interesting. Dr. Wakefield, in charge of these clinics, is adding to his other responsibilities that of visiting with the films



the family physicians of those children showing X-ray evidence of tuberculosis. Almost without exception he is cordially received and this should go far toward assuring prompt adequate care. There are few more difficult dilemmas than those of the parents of children in whom the clinics and the private physicians disagree and carry on clumsy and remote, if not vituperative, negotiations. To these parents the cults must look comfortable, for whatever their shortcomings there is never the least element of doubt.

This year we have had the advantage of a number of conferences at Westfield with Colonel Russell and others of the Rockefeller Foundation, as well as Dr. Opie and Dr. McPhedran of the Phipps Institute. As a result, Dr. Aronson from the Phipps Institute spent some weeks this fall with members of our staff, studying the Pirquet and intracutaneous tuberculin reactions on some 5,000 children. This and other discussions that we have had open up clinical and epidemiological questions of great importance, which our vast material would give promise of answering, at least in part. Additional studies should parallel the extensive statistical studies at present under way, with temporary financial aid from the Rockefeller Foundation. It is hoped that resources may be found this winter to institute such studies.

*Institutions.* — For the moment, with the additions opened last summer, our crushing waiting lists at Lakeville, North Reading, and Westfield seem, temporarily at least, to be met. But Rutland's list of 140 is the highest in its history. Relief here can come only when the Counties of Middlesex and Worcester open their hospitals, and meet their much delayed obligation.

During the hospital year the four State Sanatoria served 2,008 patients, of whom 383 were non-pulmonary at Lakeville, 991 were children at North Reading and Westfield, and 634 were adults at Rutland. At Lakeville a new children's building, with 72 beds, and an artificial heliotherapy room to serve the entire institution, was opened, making the total bed capacity here for non-pulmonary cases 297. At North Reading a new admission and isolation building was opened, accommodating 73, of whom 26 may be infants, making the total beds for children here and at Westfield 575. At Rutland, with its 360 beds, a medical and surgical building is under construction. The clinic patients served in and out of the institutions were as follows by sanatoria: Lakeville 74, North Reading 881, Westfield 1767, Rutland 537. With the increasingly obvious need of recognizing our tuberculosis earlier and earlier, if the vast resources, private, city, county and state, are to be effective, which means recognition while the case is still entirely ambulatory, our clinic service and that of the counties and all other tuberculosis institutions must be vastly expanded. We hope legislation encouraging this, which we understand the County Commissioners will introduce, will be promptly passed.

The food situation at our institutions has been carefully studied this year by an astonishingly competent nutritional committee and its recommendations are being followed as promptly as possible. At present the occupational therapy needs of these same institutions are being studied by a similar committee. That our institutions will not be stifled by many studies is assured by the vision of the personnel of these committees who see in a broad way the entire objectives of each hospital. Again I must repeat that I think nowhere else in the country can a governmental agency command such devoted, qualified, and unremunerated service as in Massachusetts.

We must record our gratification at the appointment of Dr. Sumner H. Remick, so long the splendid director of our Division of Tuberculosis, as Superintendent of the Middlesex County Tuberculosis Hospital, and Dr. Edson W. Glidden, formerly of Massachusetts, lately of Georgia, as Superintendent of the Worcester County Tuberculosis Hospital. The quality of service that they will give in the 300 beds under their control will not only relieve the immediate staggering burden carried now these many years by Rutland, but will raise the entire level of service to the tuberculous over the State.

*Gonorrhea and Syphilis.* — Our decision of last year to return after four years to having these diseases reported directly to us rather than to the local boards of health, as are all other communicable diseases, seems amply justified by results. Eleven thousand, one hundred and seventy-one cases were reported, which is almost double the number for last year. Reports came from about 1,100 doctors, while

we estimate that some 4,000 are treating one or both of these diseases, and from 110 clinics and institutions. Again in 1929 only 27 per cent of our cities and towns reported to their local boards of health any cases of gonorrhea and syphilis, while this year 73 per cent so reported directly to us.

Now in the third year of purchasing rather than manufacturing arsenicals there was still a slight increase of 300 grams distributed over the year before, making the total 44,800 grams. Neoarsphenamine shows an increase of 24 per cent, arsphenamine of 7 per cent, and sulpharsphenamine a decrease of 27 per cent. Eighty per cent of the product goes to clinics and institutions, but 500 physicians now use our products, 167 having been added this year.

In the western and southeastern parts of the State Dr. DeWolfe, of our staff, has now visited 349 physicians in their offices. With two notable exceptions, he has been received cordially, which is perhaps more than we had a right to expect, and speaks well for his diplomacy. He is answering questions and discussing all aspects of the Department's work, with, of course, special emphasis on gonorrhea and syphilis. From this, as it extends, we will have invaluable information for program building. From those already seen, there has been a 50 per cent increase in reporting, leaving 260 not reporting, of whom 134 claim not to treat these diseases.

A notable demonstration of what intelligent follow-up and case finding can do in increasing the effectiveness of a venereal disease clinic has been demonstrated at Lowell and reported.<sup>1</sup> This was a cooperative venture on the part of the Lowell Board of Health, the American Society of Social Hygiene, the Massachusetts Society for Social Hygiene, the Permanent Charity Fund, and this Department. And still it went well! On the theory that this sort of service should not be, but usually is, denied to private patients, and that if the reports in the first instance were by identifying data this service would or should be given by official agencies, we are trying in a small way placing our social worker at the service of a few selected physicians, who have some idea what it is about, to give follow-up and source of infection service to their private patients. If it works out intelligently and, of course, is not exploited, it may open wholly new vistas in effective service against these diseases.

Over 20 per cent of the druggists of the State, as already reported,<sup>2</sup> are cooperating in distributing informative pamphlets on gonorrhea and syphilis to those inquiring, and in recommending clinic or private medical care, this in spite of the fact that one of the druggists at a hearing before the Committee on Habit Forming Drugs postulated that self-medication of any kind is an inalienable right! If so, why get so excited about proprietaries at cigar and candy stores? Over 10,000 leaflets have been sent to these druggists. A wide variety of other printed matter has been sent out largely through physicians for their own instruction and for them to give selectively to their patients. This totals 70,000. A wide variety of lectures has been given to medical societies, medical and other students, nurses and the like. At the New England Health Institute such visiting notables as Stokes, Pelouze, Givan and Hugh Cabot spoke first to the doctors and then to the public on various aspects of the subject. The Massachusetts Society for Social Hygiene is still carrying on the bulk of the public education in this field and has added an unusually competent medical student to its speaking staff. Prior to this, the entire work had been carried by a woman physician of vast experience and skill. We are enormously encouraged by the increasing support and widening program of this Society, since there is probably no field in which ultimate success is more dependent upon informed public opinion than this.

*Outbreaks.* — Twenty-eight outbreaks of disease have been studied by the Department this year, of which eight were typhoid, two septic sore throat, psittacosis, ginger paralysis, and the inevitable host of explosive and elusive intestinal outbreaks. There is nothing that keeps a health department staff toned up more than an occasional outbreak, although I agree with Dr. Frost that we should not limit our epidemiological studies to epidemic disease, but concentrate on the endemic disease which has much of the ubiquity of the poor. However, I suppose, it is something like the bell to the old fire horse, and heaven knows, as with a fire, when you have to jump it is never possible to jump too quickly or too fast. As we have seen, hours may save cases and deaths.

<sup>1</sup>New England Journal of Medicine, Vol. 203, No. 24, Dec. 11, 1930.

<sup>2</sup>New England Journal of Medicine, Vol. 203, No. 4, pp. 172-173, July 24, 1930.



*Diphtheria.* — The 3,325 cases of diphtheria are a decrease of 22 per cent over 1929 and mark a new low point for this disease in Massachusetts, as in other parts of the country. As one of the retiring city health officers, who had a real gift for thinking up reasons for inactivity, remarked a few years ago when his city was particularly fortunate as regards diphtheria, "If we'd given toxin antitoxin last year, we'd have said that was what did it." It is easy to believe that he would have said it! Since then his city has become conspicuous for its high diphtheria rate in spite of the general favorable picture over the State. Among the larger communities with conspicuously high diphtheria rates are Cambridge, New Bedford, Salem, Somerville and Springfield. They have all neglected any well-planned continuous immunization program. Nero was a thoughtful philosopher with all his wretched fiddling compared with the health officer who is lulled into inactivity against diphtheria by low incidence, since it is absence of any disease that is the most potent single factor in building up a high susceptibility rate to that very disease.

It is, however, heartening to find that this year over 400,000 doses of toxin antitoxin mixture were distributed. This marks a high point in distribution of this product and shows that by and large local health officials are alive to their responsibility. Also, the Antitoxin and Vaccine Laboratory reports perfecting a method whereby diluted toxin for the Schick test can be distributed, thereby removing any danger from improper diluting in the field, increasing convenience and cutting costs in halves.

*Typhoid Fever.* — There has been an increase of about 5 per cent in our typhoid cases, to 317, although the death rate remains at the astonishing figure of 0.8 per 100,000 of the population. Considering the high incidence of this disease through the country, these figures are not unfavorable. In 30 per cent of the cases the source of infection was identified. Of these, 45 per cent were due to food infected from an unknown source, 23 per cent were due to polluted water (in one instance an industrial cross connection), 15 per cent by direct contact with a carrier or through food, and 17 per cent by contact with a known case. This last figure shows a gratifying reduction in secondary cases which are, of course, evidence of the grossest neglect. It is also gratifying that this is the second year since 1886 that no milk-borne typhoid has been identified. The other year was 1929. Can it be that our milk supplies are really that much safer, or is it that with continuing low typhoid rates the incidence of carriers to menace the milk is falling off? Nine new carriers were added to our list, six as a result of outbreaks, two from convalescent cultures which we are encouraging, and one moving in from Connecticut. We hope we may reciprocate in kind to our sister state!

*Smallpox.* — No new legislation! Only two cases, both of whom had never been vaccinated. The sources of infection could not be determined.

*Meningococcus Meningitis.* Due to the sharp increased prevalence of this disease starting almost two years ago in California and working east, last spring we arranged for a consultant from the staff of the Harvard Medical School and Children's Hospital, who should be on call for any doctor in the State who suspected meningococcus meningitis, to make a diagnosis, be prepared to administer the first serum and advise as to future handling of the case. Although throughout last winter there was a somewhat increased incidence, it fortunately fell this fall so that this year we had reported only 174 cases as against 167 last year. Our consultant was called 35 times and in 11 cases the diagnosis of meningococcus meningitis was made. However, as it takes some time for such new consultant service to integrate with the profession as a whole we have determined to continue it for the year at least.

*Infantile Paralysis.* — With 503 cases reported there was some apprehension of an epidemic, particularly north of Boston where the early cases were concentrated. While this is over 300 per cent more than last year, 1929 was almost unprecedentedly low. In 1928 there were 434 cases. This year, then, might be called high "normal" even though since the peak in 1916 it has been surpassed only in 1920 and 1927. Later in the season cases appeared in Middlesex County, Worcester County, and the southeastern section of the State. For some time now west of Worcester has been largely free of this disease. These low years and these free areas are unfortunately probably forerunners of high years to come.

Fortunately when this time comes our cooperative service with the Harvard

Infantile Paralysis Commission will have become generally known by the profession over the State. One hundred and thirty-seven cases of anterior poliomyelitis were seen in response to 204 calls. Seventy-seven of these were early enough to warrant treatment with convalescent serum. Through the New England Council has come the wise suggestion that the other New England States join Vermont and Massachusetts in supporting the Commission so that an epidemic anywhere in New England might have this service. Certainly the greater the resources, the greater the flexibility to meet any emergency.

*Rabies.* — Rabies continues high. Three hundred positive dogs' heads were diagnosed in our laboratory. The dog bites reported numbered 5,189 or 12 per cent more than last year. There was only one human death, which bears striking testimony to the effectiveness of the Pasteur prophylaxis. During the last few years of high incidence the disease has been largely limited to dogs in the eastern part of the State, but this year it has spread west, foci appearing in Worcester, Pittsfield and Springfield. In each locality there is much talk of dog quarantine and much fear about the indignation of the dog owners. As long as our people have minds like the average anti-vivisectionist, and care more for dogs' comfort than for humans' we will have what we now have, and that is an utterly inexcusable prevalence of rabies.

*Scarlet Fever.* — Scarlet fever showed a decrease of about 6 per cent, and otherwise nothing notable. Our antitoxin in the moderate and severe cases gives striking immediate results. We advise against its use for passive immunization.

*Septic Sore Throat.* — Of the 422 cases reported, 178 and 17 were accounted for in the two milk-borne outbreaks in Ayer and Wilbraham, respectively. The Ayer experience was followed by a regulation requiring that all milk be either pasteurized or certified. That puts Ayer in the class with Boston and Chelsea in this regard. It is good that these outbreaks leave some slight trail of protection behind them.

*Influenza, Measles, and Whooping Cough.* — It was, fortunately, not an "influenza year," but it was a moderate "measles year," the figures rising from 14,925 in 1929 to 27,139 in 1930. It was centered largely in the Metropolitan area in the late winter and spring. Presumably the early months of next year will be high in other sections of the State. We have circularized all physicians in regard to the immunizing value of whole parental blood, particularly for young, sickly and institutionalized children. We are about to put out ampules of sodium citrate solution for use in syringes to delay clotting and thus make this method of prophylaxis more practicable in the field. Whooping cough also showed a 39 per cent increase this year. In control of this disease we are quite completely futile. Practical methods of using cultures for early diagnosis or release from quarantine have not yet materialized. The prophylactic and therapeutic use of vaccines is, to say the least, in dispute. With its long quarantine and relatively high incidence, it is probably the most disrupting and expensive disease in our schools.

*Undulant Fever.* — This disease was reported 6 times during the first year that it has been reportable in Massachusetts. There was an immediate or remote history of raw milk drinking in each instance. The Boston Medical Milk Commission will now certify milk only from herds that are abortus free. At our Wassermann Laboratory we are cooperating with the Division of Animal Industry of the Department of Conservation in offering serum diagnosis on cows. In our Bacteriological Laboratory we are offering diagnosis on human blood. In any case, whether the disease is more prevalent in this State than has been generally recognized, it is unequivocally another argument for pasteurized milk.

*Psittacosis.* — With the rest of the eastern part of the country we became interested early in the year in cases of illness with varied manifestations associated with sick parrots. In 15 it seemed reasonable to maintain a diagnosis of psittacosis. Unfortunately the apparently characteristic X-ray picture of the lungs had not been pointed out at that time. A report of these cases is now in the hands of the New England Journal of Medicine.

*Laboratories.* — The Diagnostic Laboratory examined 35,830 specimens, or 5 per cent more than last year. Cultures for diphtheria and typhoid showed the most increase.

The Antitoxin and Vaccine Laboratory exceeded all previous years in quantitative distribution. Of particular interest is the production and selective distribution of



concentrated antipneumococcus serum which has received universally favorable reports from all the hospitals using it, and which forms the basis of the pneumonia studies and service which we plan to develop this year with the aid generously granted from the Commonwealth Fund of New York City; the distribution of our own Old Tuberculin; the preparation of diluted diphtheria toxin for Schick tests by a method developed in our own laboratories, as mentioned elsewhere; the prosecution of investigative work on various aspects of the manufacture of biologic products which will result shortly in a number of publications; and in the Wassermann Laboratory investigative work on the Hinton, Kahn and Wassermann tests for syphilis which gives prospect of a substitution of the Hinton test for the other two, resulting in a considerable saving.

### III. NON-COMMUNICABLE DISEASES

*Child Hygiene.* (a) *Prenatal and Postnatal.* — Through order blanks to hospitals and otherwise we have expanded our prenatal and postnatal letter service until about 1,000 names are added each month, totaling about 300,000 letters sent out this year. These are continued through the child's first two years and are received with general favor. Demands for letters to prospective fathers have also been growing, which is good, as they are certainly needed, particularly before the arrival of the first baby.

Hospitals providing beds for maternity cases were circularized and 140 replied. Only 54 admitted to any prenatal service whatever, while seven said they gave no instruction in breast feeding. Must not the hospitals feel some responsibility in the present hue and cry for more and more hospitalization of obstetrics? We plan to visit these hospitals and hope conditions may not be quite as bad as the replies would indicate. All this again raises the question of the need of organizing some sort of obstetrical and pre- and postnatal institutes. We hope light may be given us as to how this may be effectively done. Certainly some of the addresses at the New England Health Institute would revolutionize conditions if generally followed.

(b) *The Pre-School Child.* — The well-child conference, of course, gives supervision to the well infant and child up to school age. In our demonstration in Franklin County, details of which appear elsewhere in this report, 1,316 examinations were made. Sixteen conferences were held elsewhere in the State. A nutritionist always has been a member of the Department's staff, but this year her services were loaned to permanent local conferences as far as possible. Four new local conferences were organized, making now 118 communities in the State having them.

Interest in the Summer Round-Up of children about to enter school is increasing. Already 161 towns have reported but as final figures on defects corrected are delayed until the completion of the examination of the first graders, the final reports are not yet entirely available. In 1929 reports were made by 185 towns. Of these, 112 report 1,871 defects corrected.

Of course this age group is the most effective for dental hygiene, nutritional and immunizational service. In general, the younger the age group the greater the return on the dollar spent in prevention. This certainly makes one wonder as to the economics of adult hygiene.

(c) *School Hygiene.* — We have continued our school hygiene survey service and have had requests from eight communities. Three school hygiene conferences were held in collaboration with the Department of Education. Also six regional conferences of school physicians were held, which in general were more inspiring from a qualitative than a quantitative standpoint, and after all it is on quality that sound inspiration must rest. As an outgrowth we are considering asking the school physicians of the State to elect regional representatives for an Advisory Committee of School Physicians. We could take up with them such matters as the use of the school examination card, uniform content of examination, uniform methods of handling communicable disease in the schools (subject, of course, to any whimsical departures from the minimum quarantine regulations that the local board of health may see fit to promulgate), and any other matters that are vexing the school physicians and in which a supported opinion may be of help to them. The Department's Handbook of School Hygiene should be available early this next year. While it covers a vast number of matters in which the last word is far from having been said, because of the great care in its preparation and the many experienced persons consulted, it

should be of great help to superintendents, school physicians and nurses, and others interested in accepted health practice in the schools.

The Lynn High School study, initiated by the Massachusetts Tuberculosis League, is now in its second year under a well functioning Health Council of teachers in the school. We furnished physicians last year to make the physical examination and this year, through our Chadwick Clinic staff, resources for X-rays and certain physical examinations. It is profoundly to be hoped that out of this will come something factual as a guide to sound health education in the high schools.

The summer courses at the Hyannis Normal School for teachers, nurses and dental hygienists interested in school work have now been given for a number of years. The courses will be conducted for teachers and school nurses, but we are discontinuing the course for dental hygienists, believing that they can be served elsewhere.

(d) *Public Health Nursing*. — The whole problem of undergraduate and post-graduate training would seem to be wide open, as well as the setting of some reasonable minimum standards of training and experience for the vast number of nurses in this field in Massachusetts employed by official and private organizations. Last winter, as reported last year, we had an Advisory Committee on Public Health Nursing and Social Service. This year we have split it up into its component parts and the Nursing Committee is helping us work out what part we can soundly hope to take in the field of postgraduate education.

Within the Department we have nurses in the Divisions of Child Hygiene and Tuberculosis, the generalist and the specialist, side by side. We must look forward to a reorganization that will use them more effectively, and in this the Advisory Committee can be of great help. Through the cooperation of the Rockefeller Foundation we are about to send off our second child hygiene nurse for a "refresher" course of a month at the East Harlem Nursing and Health Center in New York City. As would be expected, this contact gives a stimulus and practical experience which will be of value for a long time to come.

(e) *Dental Hygiene*. — This year 310 towns ordered material from the Department for dental campaigns, and 178 reported results. Some 265,000 children were reached, of whom 44,774 received certificates from family dentists and 45,989 from clinics. Corrections reported varied by towns from 5 to 50 per cent. The Department gave consultation in 43 communities. Our Dental Advisory Committee has been called on to help develop policies for pre-school and Summer Round-Up work and to help fill demands from the towns for dentists and hygienists.

(f) *Nutrition*. — Our nutritional staff has continued to serve, with some modification, the Chadwick and follow-up clinics in the schools; advisory service was offered to summer camps and thirteen were visited; in 98 communities we advised with the local authorities as to their school lunch problems; and, as has been stated, we added a nutritionist to our well child conference staff with great satisfaction to the mothers. Seventy-seven talks have been given, as well as five courses of lectures to nursing groups, and day and evening courses with nutrition clinics at the Fitchburg Normal School. The Natick and Wellesley nutrition demonstrations are in their second year and will, we hope, be taken over by the communities. It may be remembered that they were started in response to a request as to how a local nutritionist could be effectively used.

(g) *Health Education*. — Although each Division handles health education connected with its field, the Division of Child Hygiene covers a wider scope than any other, though the field of the Division of Adult Hygiene is growing astonishingly in this regard. Though it may make for some confusion, I still definitely feel that there is more authority and freshness to education handled by the Division involved than if the thing is segregated in a water-tight divisional compartment of its own.

Some 2,180,000 pieces of printed matter were handled by the Division of Child Hygiene. The Tercentenary celebration (133,000 pieces), the Child Health Day and the Summer Round-Up (768,000 pieces), and correlation of health education with the art work in the schools (421,000 pieces, with 191 new charts, illustrations and posters) accounted for much of it. Forty states and nineteen foreign countries asked this year for copies of our material. Seven hundred and sixty-one lectures, 45 radio talks, 53 motion picture showings and 57 delineascope showings were given. All this must, if it does anything, contribute to informed public opinion on which any permanent progress must be based.



*Adult Hygiene.* — The question of the economics of adult hygiene has been already referred to, but whether sound or not the temper of the people, as evidenced by past cancer legislation, is such that we must handle it. Thus we find ourselves leading the other states in this field and once in, as always happens, we find the field widening bewilderingly.

(a) *Cancer Hospital.* — Our Pondville Hospital, which last summer added 25 beds, new clinic quarters and enlarged X-ray equipment, now has 115 beds and handled 883 patients last year. With the new beds available throughout the next year we should serve over 1,000. Of these patients, 155 were readmissions. As time goes on this group of patients, who have been to us for relief, will inevitably grow and this will as inevitably affect unfavorably our death rate which may assume such proportions as to jeopardize the good name of the hospital. For the first year, 25 per cent of our discharges were deaths, and this year the figure has risen to 30 per cent. There were 1,376 visits to our weekly clinic, of which 546 were first visits. One hundred and sixty-eight patients were admitted to the hospital from the clinic. We have purchased three more radium needles, and with our water-cooled tube we can shorten the X-ray treatments and handle two patients at a time. All this has speeded up treatment, increased the overturn of patients, and correspondingly increased the return on the investment in the hospital. But it has correspondingly increased the demands on the staff. Our visiting staff, now numbering 17, is giving over 300 hours of service a month. Besides the superintendent we now have four resident physicians, and are this year asking for a fifth. We graduated this fall our first five attendants from our school for nursing attendants, and at once employed them at the hospital. In spite of all this expansion of service our waiting list has reached the figure of 42. All the hospitals which handled cancer prior to the opening of our hospital report with one exception, an increased pressure. This means, as we have seen in tuberculosis, that cancer patients are coming forward more readily for treatment. As inevitably a proportion of these must be coming earlier, and as the general level of service which they receive is improving, this should all bode well for the success of the cancer program.

(b) *Cancer Clinics.* — There are now state-aided clinics in 15 different communities in the State. A new one at Brockton was opened last June. In addition there are, of course, many excellent cancer clinics entirely independent of state aid. At the state-aided clinics in 1928 the attendance was 2,500, while in 1929 and this year it was approximately 2,000. Since the new clinic at Brockton accounted for 8 per cent, it means that at the other clinics there has been a still further reduction in attendance this year. Whether this means that with the opening of the clinics there was a residuum of cancer to be skimmed off and that we are now establishing a permanent attendance quotient, or that these clinics are appealing less adequately to the public than at first, can not yet be answered.

As pointed out before, the proportion of patients sent to these clinics by physicians is rising, and those coming because of newspaper publicity is correspondingly falling, although this latter is still the most frequent reason for attendance. Since a high proportion of the patients sent by doctors show cancer, the proportion of cancerous coming to our clinics has risen from 20 per cent in 1928 to about 25 per cent in 1930; so that even with shrinking total attendance the clinics are reaching each year about the same number of actual cancers, *i.e.*, 500. Whether this advantage is offset by more appearing in later stages of the disease, it is too early yet to state. However, a study this year of cancers seen at these clinics in 1927 and 1928, to find how many were still alive after two years, shows a 14 per cent better figure for 1928. Such studies will be continued and the intervals lengthened until they become really significant as an index of effectiveness. Special cancer clinics were held at the New England Health Institute, at Pondville, and notably for two days at New Bedford.

(c) *Cancer Studies.* — The questionnaires by Visiting Nursing Associations are still being collected. Each one on a cancer patient is paralleled by a similar questionnaire on a non-cancer case of the same age, race, sex and economic status, as a control. As the volume of these grows, it should give valuable information. We are, of course, continuing our studies of death returns, clinic records (which give unparalleled data on living cancer cases) and cancer material in our chronic disease survey of 70,000 people. It is also proposed this year, under an Advisory Committee, to review the adequacy of the various state-aided clinics and to take such

steps as the study may indicate. The active interest of the College of Surgeons in the question of cancer clinics will be of great assistance in revising our standards.

(d) *Rheumatism Studies.* — As a result of our chronic disease studies it becomes apparent that while heart disease is the most killing in this category, rheumatism (which includes arthritis and all manner of other afflictions of the joints) is the most crippling and therefore economically the most significant. The average duration of a heart case is only a few years, while the average duration for chronic rheumatism is many years. At any one time there are in Massachusetts 150,000 cases of rheumatism, varying from none to complete disability. The adequate use of our present knowledge can relieve at least 60 per cent of these. As in other diseases, the extent of relief depends in large part on the earliness of recognition and the institution of appropriate therapy. No one, I think, has the temerity to state a figure as to the possibilities of prevention, since it is almost impossible to say of a person without rheumatism that if certain steps had not been taken he would have had it. The loss in wages due to rheumatism alone is some \$8,000,000 each year. For these reasons we have asked legislative authority to develop a program for the prevention, cure and alleviation of rheumatism.

(e) *Public Health Social Service.* — We now have seven social workers in the Department in the fields of cancer, tuberculosis, and venereal disease, and we need more. Also, if, and when, we start a program for rheumatism a need in another field will face us. While receiving almost daily evidence of the increased effectiveness of results obtained by intelligent social service, I am not at all clear in our various programs as to its relationship to public health nursing. Where should they parallel, where replace, and where delegate? Is it, perchance, something like the problem of the medical and non-medical health officer, where the answer seems to be that while each has something the other has not, granted a certain minimum of training, the quality of the individual is more important than the degree conferred on him. I devoutly hope it may be more specific than that. Then there is the question of how a health department should use social workers. So far her medical social technique as used in the hospital has been taken over into the health department field, and in relation to our hospitals, this is all right. But is there not perhaps a yet un-found technique of public health social service which may differ as radically from hospital social service as public health nursing differs from hospital nursing? In these things our Advisory Committee on public health social service is thinking with us, and it is vastly interesting. In the meantime with conventional adequate medical social service the bull's-eye of effectiveness is being more often scarred.

(f) *Education.* — While continuing actively our cancer education we have been preparing for a broader program for other diseases. One hundred and nineteen newspaper releases have gone out and we have record of 6,000 inches of space, which does not include material to do with the New England Health Institute. Forty-two broadcasts, 64 lectures, 31 showings of the Lewis and Canti films, and 135,000 pieces of printed matter represent other phases of the education program. In addition, this fall we have started a weekly Health Forum which is run by 48 newspapers, and broadcast the same. As has been said, we hope to keep this from the menace of a beauty column. It is run as questions and answers. So far the questioners seem largely interested in a correspondence school diagnosis and treatment, but, of course, we are fighting shy of this and are attempting to raise it to the higher and more impersonal and less financially pertinent plane of prevention. Our experience will be interesting. Already we have had 3,600 inches of space, and this gives an admirable media for our adult hygiene education.

Our local cancer education committees are continuing in the clinic cities with varying degrees of interest and success. In some instances it is astonishing how they are grappling with the local problem of needs and resources. Here is community responsibility at its best and most promising. We have had conferences of clinic chiefs in Boston, education committees at Springfield, and clinic social workers at the Pondville Hospital.

#### IV. ENVIRONMENTAL CONTROL

In spite of the unprecedented drought it is of interest that only nine municipalities found it necessary to draw from emergency or new sources of water supply. It, however, accounts for the fact that our Engineering Division had the extraordinary



number of 574 applications for advice. Considering the low flow in the rivers, stream pollution did not bulk large in the complaints; a condition principally due to a decrease in the amount of industrial wastes discharged into these streams. This drought condition influenced the investigation of the pollution of Boston Harbor, since with the lack of rainfall, sewage overflow was abnormally infrequent, and some of the municipal sewage disposal works were consequently less overburdened than in normal years. This influenced the recommendation of the Joint Committee on Boston Harbor that from time to time and during more normal conditions the Department should reinvestigate the whole matter. The low condition of our reservoirs has further emphasized the importance of the studies being continued by our Water and Sewage Laboratories on the bacterial purification of waters by storage. The Boston Harbor study brought 2,053 chemical and 2,920 bacteriological samples to this laboratory.

*Shellfish.* — The general supervision of market shellfish, the inspection of plants for out-of-state shipment, the approval of dealers for shipment into the State, the determination of the extent of contamination, and the supervision of chlorinating plants, continue to make shellfish a most vexing matter. I shudder to think of our state of sanity were the enforcement of the prohibition of digging in polluted areas vested with us instead of with the Department of Conservation and "all other officers authorized to make arrests." The 376 samples of market shellfish showed 25 per cent sewage polluted. Two chlorinating plants are operating under our direction, and we are continuing our studies of this process. However, as the Department of Conservation is, I believe, indicating, studies on the commercial aspects of the process are much needed, such as shrinkage, breakage, keeping and discoloration.

*Summer Camps.* — This summer 176 camps were visited, seventy of which were new since our wholesale visits of 1926. In addition to the sanitary inspection and water analysis, many of which were repeated, we collected data in regard to the handling of communicable diseases, the nutritional situation, and the general camp program. We were interested to see how near they came to the standards for summer camps set up last year by the Department with the approval of the Massachusetts Association of Boards of Health, copies of which were sent to each camp director of whom we had a record. On the whole, conditions were much improved over 1926 although there are still a few that are backward. Some of these might be called "repeaters" in that while they seem glad to ask for our examination annually in order to say, "Oh yes, we are inspected," they seem to feel no responsibility for following the recommendations that are repeatedly given.

*Milk.* — The number of pasteurizing plants has risen to over six hundred, and anything like adequate inspection is very taxing. While we are asking for another man for this work, it can, of course, only be effectively done by the local inspectors who are constantly on the grounds. The principal faults are dirty equipment and inadequate time and temperature holdings. Pasteurization is an exact engineering process, and its success is jeopardized by too many untrained operators. Bacterial counts were made on 1,695 samples, largely of pre-pasteurized milk to see how well our regulations are being complied with. These counts are of value to the dealer in identifying his dirty producers. Every pasteurizing plant should feel responsible for making such checks itself on its producers. Of 6,636 milk samples, 4 per cent were found adulterated by skimming or watering.

*Other Foods.* — Of 1,723 other foods examined, such as butter, cider, confectionery, cream, dried fruits, eggs, maple syrup, sausages, olive oil, soft drinks, vinegar, and the like, 23 per cent were adulterated or misbranded. Also 143 samples of drugs showed 30 per cent so adulterated or misbranded. An interesting by-product of the drought was the fear of menace from arsenic or lead as sprays on apples. Many samples of apples and cider were collected from various parts of the State, and fortunately no ground for wholesale apprehension was found. Bakeries and cold storage warehouses were inspected as required by statute.

## V. PERSONNEL

The organization of the Public Health Council has not changed during the past year, the Governor having reappointed Dr. Lally and Dr. Lee at the expiration of their terms.

The Department has again through death lost valuable employees. Miss Mary E. Ayer, who became a member of the Department staff in 1918 as Nursing Assistant to the District Health Officer of the Connecticut Valley District and who later continued in that District and the Berkshire District as Public Health Nursing Supervisor, died in September. Miss Juliet A. Whitteker was appointed on July 1, 1930, as Public Health Nursing Supervisor and assisted Miss Ayer. Following Miss Ayer's death Miss Whitteker has taken on the work of that area.

Also in September Mr. Daniel E. McCarthy, who had been a Food and Drug Inspector for the Department since 1906, passed away. Mr. Robert G. Benson was appointed on December 1, 1930, to fill this vacancy.

On October 23, 1930, Mr. X. H. Goodnough, who had been Chief Engineer for the Department since 1886, was retired. Fortunately for the Department it has been possible to retain his valued advice as a Consultant. Mr. Arthur D. Weston was appointed Chief Engineer to succeed Mr. Goodnough, to whom he had been an assistant for eighteen years.

The County of Middlesex has benefited by the loss of the Department in the appointment on August 31, 1930, of Dr. Sumner H. Remick as Superintendent of the Middlesex County Sanatorium, now under construction. Dr. Remick had been Director of the Division of Tuberculosis (Sanatoria) for nine years. Dr. Alton S. Pope, who had been Epidemiologist in the Division, was appointed Director. Dr. John J. Poutas was appointed to succeed Dr. Pope as Epidemiologist.

Dr. Edward A. Lane resigned as Assistant Director of the Division of Communicable Diseases on May 31, 1930, and Dr. Gaylord W. Anderson, formerly Epidemiologist, was appointed as Assistant Director. To fill the vacancy caused by Dr. Anderson's promotion, Dr. Ralph E. Wheeler joined the staff as Epidemiologist.

On April 17, 1930, Dr. Frederick S. Leeder was appointed as District Health Officer of the Berkshire District to fill the position which had been vacant since the resignation of Dr. Leland M. French on December 31, 1929.

Dr. Wilson W. Knowlton on April 30, 1930, was transferred from District Health Officer of the Northeastern District to special work as supervising health officer of the rural health units, mentioned elsewhere in this report. Dr. Robert E. Archibald was appointed on May 1, 1930, to fill the vacancy in the district north of Boston.

Mr. Harold S. Adams has been appointed as a Food Inspector and assigned to assist Dr. Knowlton in his supervisory work in the rural health units. Miss Nora McQuade has also been appointed to assist Dr. Knowlton and is classified as a Public Health Nursing Supervisor.

In order to carry out a long-considered expansion of the program for venereal disease control, Dr. Henry M. DeWolfe was added to the staff on April 1, 1930, as Epidemiologist.

On June 1, 1930 Dr. Hubert P. Colton resigned as Child Welfare Physician working with the Chadwick Clinics and Dr. Francis H. MacCarthy, who had previously worked with the Clinics, was reappointed to fill this vacancy. Dr. Nettie A. Pidgeon was added to the staff of the Clinics as Child Welfare Physician on September eighth. Miss Katherine F. Mullane was also added to the staff of the Clinics on September eighth as an additional Tuberculosis Field Nurse.

A transfer between Divisions occurred when Mr. Bernard E. Bradley, who had been in the Subdivision of Venereal Diseases since 1922, first as a Special Investigator and later with the classification of Public Health Social Hygiene Supervisor, was appointed on December 1, 1929, as Epidemiologist in the Division of Adult Hygiene where he is assisting with the surveys and related work.

On December 16, 1929, Miss Nathalie B. Upton was appointed as an additional Public Health Social Work Supervisor in the Division of Tuberculosis, in accordance with the program of expansion of social work in connection with the follow-up and care of tuberculosis cases.

## VI. ORGANIZATION

The organization of the Department is as follows:

Commissioner of Public Health . . . . .	George H. Bigelow, M.D.
Public Health Council . . . . .	6



P. D. 34.	15
Division of Administration:	
Secretary (1), Epidemiological Consultant (1), Statistical Consultant (1), Clerks and Stenographers (11)	14
Division of Adult Hygiene:	
Herbert L. Lombard, M.D., Director.	
Epidemiologists (2), Social Workers (2), Public Health Education Workers (2), Clerks and Stenographers (16)	23
Division of Biologic Laboratories:	
Benjamin White, Director.	
Assistant Director (1), Chemists and Bacteriologists (8), Laboratory Assistants (2), Laboratory Helpers (10), Stable Foreman (1), Laborers (14), Janitors (2), Clerks and Stenographers (3).	
(Wassermann Laboratory):	
Chief of Laboratory (1), Bacteriologist (1), Laboratory Technician (1), Laboratory Assistant (1), Laboratory Helpers (5), Clerks and Stenog- raphers (3)	54
Division of Communicable Diseases:	
Clarence L. Scamman, M.D., Director and Deputy Commissioner.	
Assistant Director (1), District Health Officers (6), Epidemiologists (3), Clerks and Stenographers (12).	
(Diagnostic Laboratory):	
Bacteriologists (4), Laboratory Assistant (1), Laboratory Helper (1), Laborer (1), Clerk (1).	
(Venereal Disease):	
Epidemiologists (2), Public Health Social Hygiene Supervisor (1), Public Health Education Worker (1), Clerks and Stenographers (2)	37
Division of Food and Drugs:	
Hermann C. Lythgoe, Director.	
Chief of Laboratory (1), Chemists (5), Veterinary Inspectors (3), Food Inspectors (5), Food and Drug Inspector (1), Laboratory Helpers (4), Clerks and Stenographers (8)	28
Division of Child Hygiene:	
M. Luise Diez, M.D., Director.	
Child Welfare Physician (1), Head Supervisor of Public Health Nurs- ing (1), Public Health Nutrition Workers (6), Dental Hygiene Super- visor (1), Public Health Education Workers (2), Clerks and Stenog- raphers (8).	
(Maternal and Child Hygiene):	
Child Welfare Physician (1), Public Health Nursing Supervisors (4), Clerks and Stenographers (6)	31
Division of Sanitary Engineering:	
Arthur D. Weston, Chief Sanitary Engineer.	
Engineers and Engineering Assistants (14), Clerks and Stenographers (10)	25
Division of Tuberculosis:	
Alton S. Pope, M.D., Director.	
Assistant Director (1), Epidemiologist (1), Superintendent of Sanatoria Construction (1), Inspector of Settlements and Support Claims (1), Social Workers (2), Field Nurses (4), Clerks and Stenographers (9).	
(Tuberculosis Clinics):	
Supervisors of Tuberculosis Clinics (2), Child Welfare Physicians (5), Field Nurses (4), X-ray Clinic Field Agent (2), Clerks and Stenog- raphers (9)	42
Division of Water and Sewage Laboratories:	
Harry W. Clark, Director.	
Chief of Laboratory (1), Chemists and Bacteriologists (10), Laboratory Assistant (1), Laboratory Helper (1), Mechanical Handyman (1), Laborer (1), Clerks and Stenographers (2)	18
Total	279

The quota of employees at each of the institutions under the supervision of the Department is as follows:

Lakeville State Sanatorium . . . . .	173
North Reading State Sanatorium . . . . .	155
Rutland State Sanatorium . . . . .	209
Westfield State Sanatorium . . . . .	147
Pondville Hospital . . . . .	119
	<hr/> 803
Grand total for the Department . . . . .	1,082

## VII. PUBLICATIONS

The following articles by members of the staff have been published:

### *Division of Administration*

#### Changing Causes of Death

Dr. George H. Bigelow and Angeline Hamblen

New England Journal of Medicine, 202: 215-217, January 30, 1930

#### Epidemic Meningitis Control

Dr. George H. Bigelow and Dr. Gaylord W. Anderson

New England Journal of Medicine, 202: 518-520, March 13, 1930

#### Tuberculosis Control in Massachusetts

Dr. George H. Bigelow

Journal of Outdoor Life, March, 1930

#### Relation of Clinics and Health Associations to Medical Profession

Dr. George H. Bigelow

New England Journal of Medicine, 202: 949-951, May 15, 1930

#### The Support of the Druggist in the Control of Gonorrhea and Syphilis

Dr. George H. Bigelow and Dr. Nels A. Nelson

New England Journal of Medicine, 203: 172-173, July 24, 1930

#### A Solution of Rural Health Service in Massachusetts

Dr. George H. Bigelow

New England Journal of Medicine, 203: 477-478, September 4, 1930

#### Private Practice and Public Health

Dr. George H. Bigelow

West Virginia Medical Journal, 26: 513-520, September, 1930

#### Milk-Borne Disease in Massachusetts

Dr. George H. Bigelow and Dr. Filip C. Forsbeck

American Journal of Public Health and the Nation's Health, 20: 1094-1104, October, 1930

#### The Cancer Program of Massachusetts

Dr. George H. Bigelow

Miscellaneous Contributions on the Costs of Medical Care: Number 6.

### *Division of Adult Hygiene*

#### The Chronic Disease Problem in Massachusetts:

Study No. 1 — The Increase of Chronic Disease in Massachusetts

Dr. Herbert L. Lombard

The Commonwealth, October, November, December.

#### Cancer Studies in Massachusetts

Study No. 4 — Why Do People Delay?

Dr. Herbert L. Lombard and Mary P. Cronin

The Commonwealth, October, November, December

#### The Chronic Disease Problem in Massachusetts

Dr. Herbert L. Lombard

Hospital Social Service, November, 1930

#### Chronic Rheumatism in Massachusetts

Dr. George H. Bigelow and Dr. Herbert L. Lombard

New England Journal of Medicine, December 18, 1930

### *Division of Communicable Diseases*

#### Undulant Fever

Dr. Edward A. Lane

New England Journal of Medicine, 202: 217-218, January 30, 1930

## The Control of Syphilis Versus the Control of Tuberculosis

Dr. Nels A. Nelson

New England Journal of Medicine, 202: 1095-1099, June 5, 1930

## An Outbreak of Milk-Borne Sore Throat

Dr. Edward A. Lane and Dr. Gaylord W. Anderson

New England Journal of Medicine, 203: 324-327, August 14, 1930

## Diphtheria Prevention in Lowell 1928 and 1929

Dr. John J. McNamara and Dr. George M. Sullivan

New England Journal of Medicine, 203: 413-418, August 28, 1930

## Typhoid Fever Apparently Spread by Boiled Lobster

Dr. Gaylord W. Anderson and Dr. Clarence L. Scamman

The Journal of Preventive Medicine, Vol. 4, No. 5, September, 1930

## Anterior Poliomyelitis in Massachusetts, 1907-1929

Dr. Filip C. Forsbeck and Dr. E. H. Luther

New England Journal of Medicine, 203: December 4, 1930

## Does Follow-Up Social Service Pay in a Venereal Disease Clinic?

Dr. H. L. Leland, Dr. Nels A. Nelson, and Alice I. Gorman, R.N.

New England Journal of Medicine, 203: December 11, 1930

*Division of Biologic Laboratories**(Antitoxin and Vaccine Laboratory)*

## Experiments on the Concentration of Antipneumococcic and Antimeningococcic

Horse Sera

Kenneth Goodner

Journal of Immunology, Vol. XIX, No. 5, November 1930

*(Wassermann Laboratory)*

## A Cholesterol Agglutination Reaction in Tuberculosis

Dr. William A. Hinton and Genevieve O. Stuart

New England Journal of Medicine, 202: 327, February 13, 1930

*Division of Water and Sewage Laboratories*

## Past and Present Developments in Sewage Disposal and Purification

Harry W. Clark

Sewage Works Journal, Vol. II, No. 4, October, 1930

*Division of Food and Drugs*

## Some Experiences in Food and Drug Law Enforcement

Hermann C. Lythgoe

New England Association of Chemistry Teachers, March, 1930

## Report on Dairy Products

Hermann C. Lythgoe

Journal of the Association of Official Agricultural Chemists, May 15, 1930

*Division of Tuberculosis*

## An Unusual Case of Osteogenic Sarcoma

Dr. Richard Dresser and Dr. Charles Dumas

Roentgenology and Radium Therapy magazine, January, 1930

## Mental Attitude

Dr. Paul Dufault, Rutland State Sanatorium

Journal of Outdoor Life, June, 1930

## Children's Tuberculosis Program in Massachusetts

Dr. Paul Wakefield

New England Journal of Medicine, July 24, 1930

## A Note on the Effect of the Oral Administration of Irradiated Ergosterol on the Calcium Concentration of the Blood-serum in Pulmonary Tuberculosis

Dr. Jacob Kaminsky and Mrs. Doris L. Davidson, Rutland State Sanatorium

American Review of Tuberculosis, July, 1930

## Gastrostomy as a Palliative Measure

Dr. Ernest M. Daland and Dr. Alfonso A. Palermo

New England Journal of Medicine, August 14, 1930

## Serum-Calcium in Pulmonary Tuberculosis

Dr. Jacob Kaminsky and Mrs. Doris L. Davidson

American Review of Tuberculosis, September, 1930



Interscapulo-thoracic Amputation

Dr. Ernest M. Daland

New England Journal of Medicine, October 9, 1930

Dressings in Cancer

Veronica M. Beauregard, R.N.

The Trained Nurse, November, 1930

#### VIII. NEW LEGISLATION

The Department is submitting the following proposed legislation:

##### *Relative to the Definition of Pasteurized Milk*

For some years past there has been introduced legislation which would have allowed the sale as pasteurized milk of milk heated by a particular electrical method to a relatively high temperature for a short time. This, the Department of Public Health has consistently opposed: first, because it was felt that the safety on a commercial scale of "flash" pasteurization (high temperature and short time), which was completely discredited some fifteen years ago, had not been established as contrasted with the present legal methods of "holding" pasteurization (lower temperature and longer time); and second, because it was felt to be grossly unsound to favor through legislation any particular patented method of applying heat.

Now we are in possession of details of studies by the U. S. Public Health Service on the basis of which the conclusion is drawn that in recent years mechanical safeguards have been developed which, under certain restriction, make "flash" pasteurization by steam or electricity reasonably safe. Thus, the Department of Public Health feels that it can no longer oppose in this matter, and is therefore introducing legislation which, under certain restriction, would allow milk heated by either "flash" or "holding" methods to be sold as pasteurized.

##### *Relative to the Sale of Milk*

For the sixth successive year the Department of Public Health asks legislation which would prohibit eventually the sale of tuberculous milk in any community of more than 5,000 population. While the small communities probably need the protection most, they are exempted, unless they voluntarily accept the act, purely for the purpose of expediency. While they represent about 9 per cent of the population they would furnish about 90 per cent of the opposition.

Progress has been made! The Division of Animal Industry of the Department of Conservation is prosecuting a tuberculosis eradication program among cattle at a rate heretofore unknown in this State. The Department of Agriculture and the State Agricultural College are enlisting the cooperation of producers in a clean, safe milk. Pasteurized milk is yearly finding a larger market. More towns have passed regulations requiring tuberculin testing or pasteurizing (as this proposed legislation does) in the last two years than in the previous twenty. Of the 125 cities and towns that would be affected by this bill our records show that at least 70 already have these standards or higher. Also, at least 30 of the smaller towns not affected by this bill have this protection by local regulation.

But still nearly a million persons in Massachusetts are daily exposed to milk from potentially tuberculous cattle. At least half of these would be protected by this bill. As in every other matter, the laggard minority of communities must against their will be forced to protect themselves since disease is no respecter of town or city lines.

##### *Relative to the Penalty Clause of the Food and Drug Law*

A change of wording of the Food and Drug Law is suggested in order to overcome a difficulty that has been met in the courts when prosecuting wholesalers found to be handling adulterated or misbranded food. No such difficulty has been encountered in the prosecution of retailers. But certainly if the adulteration or misbranding has been done by the wholesaler he is the one who should be prosecuted, and therefore the Department of Public Health asks for this change in the law.

##### *To Promote the Cure, Alleviation and Prevention of Rheumatism*

During the past two years the Department of Public Health has collected more extensive data on chronic disease in Massachusetts than has formerly been available anywhere, certainly in this country. The volume of the problem is staggering, and



with curtailed immigration and a falling birth and death rate, it is annually assuming larger proportions since the average age of our population is advancing. The size and increasing proportion of the problem clearly demonstrate that something must be done, and that this something must utilize to the limit our preventive, curative and alleviatory knowledge. To visualize merely endless expansion of custodial care would be too short-sighted to be tolerated.

Chronic disease sickens some 500,000 and kills some 30,000 of our citizens annually. One in every four persons over forty years of age has some form of chronic disease. Heart disease is the most killing, with an annual toll of 10,000; cancer comes next with 5,000 deaths. For this latter disease the Department has developed a program costing about \$250,000 annually. This program must not lag but must be improved and expanded.

The most crippling of all chronic disease is rheumatism. This disease has not received the popular or medical attention which its prevalence would warrant, perhaps in part because it does not kill and we are likely to be attracted by high death rates. But its economic significance is increased by the very fact that while it cripples it does not kill. Our studies show that at any one time there are in Massachusetts some 150,000 cases of rheumatism, varying all the way from complete disability to none. It is estimated that over 6,000 of these cases are completely disabled. For the average untreated cancer case, the duration is some two years; the average heart case runs two or three times this figure; while the average case of rheumatism lasts seven to eight times this figure. From this we conclude that economically rheumatism is the outstanding chronic disease problem in Massachusetts, if not in the United States and the entire world.

Experience in well-conducted rheumatism clinics shows that 60 per cent of the patients can be improved, which means partial or complete economic recovery. Further, through education and early recognition a yet unknown number can be prevented from contracting the disease, or at least the incapacity from the disease. Because of all this, and in spite of the fact that much is yet to be learned about the disease, the Department of Public Health asks authorization to develop a hospital, clinics, and educational program for rheumatism at an initial cost of a million and a half dollars.

#### *Relative to Emergency Water Supply*

From time to time Section 40 of Chapter 40 of the General Laws, providing for supplying of water in emergencies, has been amended. None of these amendments, however, provide authority for a fire and water district, or state or county institution to take water under this act, and no provision is made for taking water during an emergency from the ground. During the recent drought, examples of the need of such authority have arisen and we are therefore asking in the bill that such authority be given, subject to our approval.

#### *To authorize the Town of Walpole to Supply Water to the Pondville Hospital*

During the last year because of the inadequacy of the water supply at the Prison Camp in Norfolk, the town of Walpole extended its water supply mains to the vicinity of that camp but could not actually supply water as said town had no legal authority to distribute water in the town of Norfolk. These mains pass within a comparatively short distance from the Pondville Hospital. As a connection with the mains of a public water supply like that of the town of Walpole would be of particular advantage to this hospital, we are asking for legal authority whereby the water commissioners of Walpole may lay mains and sell water within the town of Norfolk and to the Pondville Hospital.

## FINANCIAL STATEMENT.

*Appropriations and Expenditures for the Year ended November 30, 1930.*

	Appropriations Plus Amounts Brought Forward.	Expenditures.
Division of Administration . . . . .	\$46,220 32	\$42,535 30
Division of Adult Hygiene . . . . .	76,765 19	74,994 66
Division of Child Hygiene . . . . .	60,000 00	57,696 48
Maternal and Child Hygiene . . . . .	34,700 00	33,069 32
Division of Communicable Diseases . . . . .	92,611 86	90,044 32
Venereal Diseases . . . . .	44,743 64	38,641 32
Division of Biologic Laboratories:		
Antitoxin and Vaccine Laboratory . . . . .	110,075 00	109,904 30
Wassermann Laboratory . . . . .	22,203 00	21,622 21
Division of Food and Drugs . . . . .	65,760 65	63,060 36
Administration of Shellfish Law . . . . .	3,360 00	3,278 87
Division of Sanitary Engineering . . . . .	93,091 83	81,912 94
Division of Water and Sewage Laboratories . . . . .	50,000 48	49,070 83
Division of Tuberculosis . . . . .	51,361 76	49,079 66
Subsidies to Cities and Towns . . . . .	263,000 00	262,657 71
Tuberculosis Clinic Units . . . . .	78,006 30	76,966 62
	<hr/>	<hr/>
	\$1,091,900 03	\$1,054,534 90

*Special Appropriations and Expenditures for the Year ended Nov. 30, 1930.*

	Balance of 1929 Appropriation.	Expended.
Investigation, Coastal Waters of Barnstable, Dukes and Nantucket Counties, Chapter 312, Acts 1929 . . . . .	\$1,783 08	\$322 71

*State Sanatoria**Appropriations and Expenditures for the Year ended November 30, 1930.*

	Total Appropriations Plus Amounts Brought Forward.	Expenditures to Nov. 30, 1930.
Lakeville State Sanatorium . . . . .	\$272,377 79	\$263,156 21
North Reading State Sanatorium . . . . .	246,490 48	233,732 25
Pondville Hospital . . . . .	238,909 73	219,702 76
Rutland State Sanatorium . . . . .	345,003 77	319,817 34
Westfield State Sanatorium . . . . .	275,171 22	255,640 04

*Special Appropriations.*

	Total Appropriations.	Expenditures to Nov. 30, 1930.
<b>Lakeville:</b>		
Acts 1930, Chapter 115, Item 629, "Superintendent's Home" . . . . .	\$21,000 00	\$6,125 26
Acts 1930, Chapter 115, Item 630, "Alterations on Admin. Building" . .	13,000 00	8,296 44
Acts 1930, Chapter 115, Item 631, "Furnishings and Equipment for Children's Building" . . . . .	10,000 00	9,689 44
Acts 1929, Chapter 146, Item 587 . . . . .	8,700 00 }	12,901 24
Acts 1930, Chapter 115, Item 632 . . . . .	9,000 00 }	
"Additional Fire Protection" . . . . .		
Acts 1930, Chapter 115, Item 633, "Water Supply Claims" . . . . .	6,800 00	6,005 91
<b>North Reading:</b>		
Acts 1929, Chapter 146, Item 591 . . . . .	19,000 00 }	35,835 31
Acts 1930, Chapter 115, Item 635 . . . . .	21,000 00 }	
"Power House Alterations" . . . . .		
Acts 1929, Chapter 146, Item 592 . . . . .	21,000 00 }	30,974 52
Acts 1930, Chapter 115, Item 636 . . . . .	16,000 00 }	
"Improving Water Supply and Addit. Fire Protection" . . . . .		
Acts 1930, Chapter 115, Item 637, "Addition to Dining Room" . . . .	4,000 00	3,986 43
Acts 1930, Chapter 115, Item 638, "Addition to Nurses Home" . . . .	20,000 00	5,365 96
Acts 1930, Chapter 115, Item 639, "Employees Building" . . . . .	75,000 00	13,860 94
<b>Pondville:</b>		
Acts 1929, Chapter 146, Item 598 . . . . .	78,000 00 }	102,318 55
Acts 1930, Chapter 115, Item 651 . . . . .	31,500 00 }	
"Furnishings and Equipment Hospital Unit and Out Patient Depart- ment" . . . . .		
Acts 1930, Chapter 115, Item 652, "Recreation Building" . . . . .	7,000 00	1,960 89
Acts 1930, Chapter 115, Item 653 . . . . .	500 00 }	14,175 80
Previous Appropriations . . . . .	14,000 00 }	
"Additional Fire Protection" . . . . .		
<b>Rutland:</b>		
Acts 1930, Chapter 115, Item 641, "Medical and Surgical Building" . .	35,000 00	4,096 92
Acts 1930, Chapter 115, Item 642, "Lightning Protection" . . . . .	6,000 00	13 30
Acts 1930, Chapter 115, Item 643, "Haybarn, Garage, etc." . . . . .	22,000 00	21,274 85
<b>Westfield:</b>		
Acts 1929, Chapter 146, Item 596 . . . . .	10,700 00 }	12,046 86
Acts 1930, Chapter 115, Item 645 . . . . .	6,200 00 }	
"Improving Water Supply and Fire Protection" . . . . .		
Acts 1930, Chapter 115, Item 646, "Superintendent's Residence" . . . .	21,000 00	4,308 44
Acts 1930, Chapter 115, Item 647, "Farm House Alterations" . . . . .	9,000 00	8,552 57
Acts 1930, Chapter 115, Item 648, "Children's Building Alterations" . .	11,000 00	9,874 57
Acts 1930, Chapter 115, Item 649, "Admin. Building Alterations" . . .	3,800 00	—

GEORGE H. BIGELOW, M.D.,  
*Commissioner of Public Health.*



## REPORT OF DIVISION OF ADULT HYGIENE

HERBERT L. LOMBARD, M.D., *Director*

During the past year the Division of Adult Hygiene has continued its cancer activities and its studies of chronic disease.

One State-aided clinic has been added to the twelve existing cancer clinics. The new clinic was opened at the Brockton Hospital on June 12, 1930. On January 1, 1931, there were thirteen cancer clinics operating in sixteen cities and towns.

The Division contributed materially to the New England Health Institute held in Boston April 14th to 18th inclusive and to the Tercentenary celebration held at Springfield September 14th to 20th inclusive and at the Commonwealth Armory September 29th to October 11th inclusive.

## SURVEYS

During June, July, August, and September a chronic disease survey was conducted in Attleboro, North Adams, Lynn, and surrounding towns. Records for 15,000 individuals over forty years of age were obtained. This survey was conducted to determine the amount of chronic illness in Massachusetts, its etiology, and the methods for care and treatment.

In November, at the request of the trustees of the Plunkett Memorial Hospital, a survey was conducted in Adams to determine the hospital needs of the town.

Both of these surveys were conducted by means of house-to-house canvasses.

In Springfield and Lynn 240 doctors were asked their opinions of the State-aided cancer clinics operating in the respective cities.

Approximately 900 persons over sixty-five years of age, living in Brockton, were interviewed regarding their life habits. This was a "follow-up" of the survey conducted in Brockton during 1929.

## CONFERENCES

The Fourth Annual Conference of the Associate Cancer Committees was held in Springfield October 18th. About eighty persons attended. Reports on the activities of the various cancer committees were read and discussed.

On November 24th a conference was held at the Pondville Hospital for the social workers of the State-aided cancer clinics. Eighteen persons attended including the speakers.

## STUDIES

The following studies are being analyzed:

1. Brockton Death Records: All the death records from 1851 to 1929 have been collected.

2. Visiting Nurses' Questionnaires: Data is still being collected.

3. Chronic Disease Survey: Papers on some aspects of chronic disease in Massachusetts and on chronic rheumatism in Massachusetts have been published.

4. Zone Studies: Each State-aided cancer clinic has a definite zone territory and the various clinics have been attempting to learn the whole cancer situation and the needs in their territory. Three of these studies have been completed.

5. Lawrence Survey.

7. Adams Survey.

6. Cambridge Survey.

8. Brockton Old Age Study.

## EDUCATION

The educational activities during the past year have expanded.

A new feature is the Weekly Health Forum. This was inaugurated in October. Questions regarding health, sent to this Division, and answered by qualified persons, are published weekly in forty-eight newspapers throughout the State. The Health Forum is also conducted over the radio. The Forum has been well received by the public and is greatly increasing.

About forty broadcasts have been given, including the Health Forum.

Over 6,000 inches of newspaper publicity have been received from the clipping bureau, not including over 3,600 inches that were printed in Health Forum columns.

About 119 releases have been sent to the newspapers throughout the State during the year. There have been four general releases that were sent to 241 different newspapers. (The above is exclusive of New England Health Institute publicity as the volume was so large that the Division had to hire outside help and records were not kept as ordinarily.)

Approximately 193,194 pieces of literature have been distributed. A new edition of the "Whats and Whys of Cancer" was published and was named "1931 Whats and Whys of Cancer."

Seventy-seven lectures were given with an approximate attendance of 5,597 persons.

It is estimated that 2,664 persons saw the Lewis or Canti films which were shown thirty-two times.

#### STATE-AIDED CANCER CLINICS

While the majority of the cancer clinics are held at weekly intervals, the practice varies from daily clinics to monthly.

In addition to our regular clinics there have been special clinics held for the benefit of the medical profession. At the New England Health Institute several clinics were held in the Boston hospitals. At New Bedford, Doctor Bloodgood gave a two-day demonstration clinic, assisted by members of the Pondville staff and local physicians. At the Pondville Hospital the staff gave, on December 3rd, a clinic for doctors in the nearby communities.

The total attendance at the clinics in 1930 was 2,499. This shows a considerable increase over the 1929 attendance of 2,106. The male attendance in 1930 was greater than in any previous year, but the female attendance while greater than in 1929 was less than in 1928. More cancer cases attended the clinics than in any preceding year. The percentage of individuals with cancer attending the clinics was 25.5 and of those with precancer 7.2. The median age of clinic attendance was 50.2 years. The median age of cancer patients remained about the same as in preceding years. Of all patients coming to the clinics 7.5 per cent were normal and in 3.0 per cent the diagnosis was either deferred or not made. (Table I.)

Patients came to the State-aided clinics from 191 cities and towns of the Commonwealth. The towns around the State Cancer Hospital at Pondville showed the highest rate of attendance. Of the clinic cities, Lowell had the greatest attendance. This city had the highest attendance rate in both 1928 and 1929. The attendance rate for the clinic cities themselves increased in seven, decreased in seven, and remained constant in three. (Table II.)

The total attendance was greatest in the Pondville clinic and least in the Newton clinic. Lowell, Worcester North, and Springfield showed the lowest percentage of cancer cases in their attendance. The Boston Dispensary and Worcester showed the highest percentage of cancer cases. The highest percentage of precancer cases was obtained in Pondville, Worcester North, and Springfield, while the lowest was in Brockton, Worcester, and New Bedford. (Table III.)

The median interval between first symptoms noticed by the patient and the first visit to a physician remained about the same as in preceding years. There was an interval of 6.7 months between the first symptoms and first consultation with the physician and an interval of 12.1 months between first symptoms and first visit to a cancer clinic. (Table IV.)

The longest duration of delay before first visit to physician was in skin cancer and the shortest was in cancer of the uterus. (Table V.)

The duration before first visit to a clinic was longest in cancer of the skin and shortest in cancer of the uterus. Cancers of the buccal cavity, oesophagus, uterus, and breast showed a shorter duration in 1930 than in 1929. This is very encouraging for much may be done for these types of cancer. (Table VI.)

The percentage of individuals who came to the clinics from physicians was slightly greater in 1930 than in 1929 and the percentage of those who came through reading newspaper publicity was slightly less. Approximately one-third of the group came for each of these reasons. The larger percentage of cancer and precancer patients, however, were referred by physicians. Over one-half of the cancer patients and nearly as many of the precancer patients were referred to the clinics by physicians, while only slightly over one-sixth of the cancer and one-fourth of the precancer patients came because of newspaper publicity. (Table VII.)

The physicians in the Lowell area referred fewer cases to the clinic than those of any other clinic area. Nearly two-thirds of the cases referred to the Newton and Pondville clinics came from physicians. The Brockton and Worcester North clinics had the larger percentage of their cases referred by newspapers. (Table VIII.)

When the cancer cases are subdivided into types the percentage referred by physicians is about the same as in 1929. Skin cases are referred by newspapers more than any other type. (Table IX.)

There has been a decided drop in cancer of the uterus at the clinics in 1930. Cancers of the breast remained about the same while stomach cancers and buccal cavity cancers have increased. Skin cancers also showed a decrease but not to such a marked extent. Cancers of all other organs showed an increase in 1930 for both sexes. (Table X.)

Over one-fourth of the breast cancers coming to the clinic had never seen a physician, about one-sixth of the stomach, nearly one-third of the skin, and approximately one-fifth of the total cases had never previously seen a physician. (Table XI.)

Swelling and ulceration continued to be the leading causes to bring the cancer and precancer patients to the clinics. The leading cause for those coming with other conditions was pain. (Table XII.)

The nativity of the clinic population is shown in Table XIII. The type of treatment recommended in the clinic is shown in Table XIV, and the recommendations for place of treatment are shown in Table XV.

The occupational rates for the years 1930 and 1929 have been combined. Laborers, farmers, and carpenters have the highest morbidity rate. Farmers delayed the longest time before visiting the clinics while laborers came much sooner. (Table XVI.)

A broad classification for diagnosis is given in Table XVII. The noncancerous diseases comprise nearly all forms of diseases.

Of the cancer cases 44.0 per cent were considered operable with a probable chance of cure. When subdivided into types of cancer over four-fifths of skin, over one-half of buccal and oesophagus, about one-fifth of uterus, breast, and all other groups, and a very small percentage of cancers of the stomach were in this classification.

TABLE I. — *Attendance at State-Aided Cancer Clinics*

	MALES			FEMALES			TOTALS		
	1928	1929	1930	1928	1929	1930	1928	1929	1930
Attendance . . . . .	852	758	904	1,692	1,348	1,595	2,544	2,106	2,499
Cancer . . . . .	251	274	314	275	260	322	526	534	636
Precancerous . . . . .	87	56	76	76	91	103	163	147	179
Other conditions . . . . .	413	365	436	1,058	824	988	1,471	1,189	1,424
Deferred diagnosis . . . . .	75	28	16	158	80	33	233	108	49
Undiagnosed . . . . .	—	—	8	—	—	16	—	—	24
Normal . . . . .	26	35	54	125	93	133	151	128	187
Per cent with cancer . . . . .	29.4	36.1	34.7	16.2	19.3	20.2	20.6	25.4	25.5
Per cent with precancer . . . . .	10.2	7.4	8.4	4.5	6.8	6.5	6.4	7.0	7.2
Median age of clinic attendance . . . . .	58.4	56.3	55.6	41.5	47.6	47.3	49.0	50.4	50.2
Median age of cancer patients . . . . .	64.5	64.9	64.1	54.1	58.2	58.4	60.5	61.7	61.5

TABLE II. — *Residents of Massachusetts Cities and Towns attending State-Aided Cancer Clinics*

	1930	1929
Number of places with 1 patient . . . . .	49	66
Number of places with 2-5 patients . . . . .	77	77
Number of places with 6-9 patients . . . . .	21	19
Number of places with 10 patients and over . . . . .	44	36
Total number of places . . . . .	191	198



*Places with 10 Patients and Over in 1929 or 1930*

	1930	1929	1928
Foxborough . . . . .	10.1	7.4	6.9
Norfolk . . . . .	9.1	7.9	6.0
Plainville . . . . .	8.2	1.9	1.3
Wrentham . . . . .	7.0	9.1	8.7
Franklin . . . . .	6.8	3.4	3.7
North Attleborough . . . . .	4.6	2.4	1.7
Medfield . . . . .	4.4	3.0	3.8
Walpole . . . . .	3.8	4.9	4.6
Lowell . . . . .	3.5	2.9	3.7
Mansfield . . . . .	3.5	1.3	0.8
Sharon . . . . .	3.0	1.8	0.9
Dracut . . . . .	2.3	2.6	1.9
Tewksbury . . . . .	2.1	4.0	3.2
Attleboro . . . . .	2.1	1.4	1.5
Fitchburg . . . . .	1.8	1.0	2.5
Brockton . . . . .	1.7	0.3	0.2
Athol . . . . .	1.6	0.6	0.8
Winchendon . . . . .	1.6	0.8	4.2
Whitman . . . . .	1.6	*	0.1
New Bedford . . . . .	1.5	1.1	1.9
Lynn . . . . .	1.5	1.8	2.9
Saugus . . . . .	1.4	1.4	3.1
Fairhaven . . . . .	1.4	0.6	2.2
Norwood . . . . .	1.4	0.9	1.7
Montague . . . . .	1.2	1.4	0.5
Chelmsford . . . . .	1.0	1.4	2.9
Worcester . . . . .	0.9	0.7	0.7
Leominster . . . . .	0.9	0.9	2.6
Grafton . . . . .	0.9	1.4	1.0
Dedham . . . . .	0.9	0.5	0.5
Lawrence . . . . .	0.9	0.8	0.6
Amesbury . . . . .	0.8	0.9	0.3
Gardner . . . . .	0.8	1.4	3.5
Methuen . . . . .	0.7	0.8	0.5
Milford . . . . .	0.7	0.3	0.4
Greenfield . . . . .	0.7	1.5	2.4
Pittsfield . . . . .	0.7	0.9	0.6
Springfield . . . . .	0.6	0.7	0.6
Taunton . . . . .	0.6	0.5	0.5
North Adams . . . . .	0.5	0.6	1.2
Chicopee . . . . .	0.4	0.3	0.3
Haverhill . . . . .	0.3	0.3	*
Quincy . . . . .	0.2	*	0.2
Boston . . . . .	0.2	0.2	0.1
Fall River . . . . .	0.1	*	*
Cambridge . . . . .	0.1	0.1	0.1
Somerville . . . . .	0.1	0.1	*
Salem . . . . .	0.1	0.3	0.2

\*Less than .05 per 1,000

TABLE III. — *Attendance at State-Aided Cancer Clinics, 1930*

CLINIC	Total Attendance	Per Cent Cancer	Per Cent Pre-cancerous	Per Cent Other Conditions	Per Cent Normal	Per Cent Deferred	Per Cent Undiagnosed
Berkshire . . . . .	69	24.6	7.2	55.1	10.1	1.5	1.5
Boston Dispensary . . . . .	208	38.4	7.7	42.8	4.8	5.3	1.0
Brockton . . . . .	142	24.7	2.1	54.9	12.7	3.5	2.1
Franklin County . . . . .	36	19.4	5.6	38.9	36.1	0.0	0.0
Lawrence . . . . .	134	20.2	3.7	64.2	11.2	0.7	0.0
Lowell . . . . .	400	14.7	5.2	70.3	6.0	1.3	2.5
Lynn . . . . .	205	20.5	7.3	59.0	7.8	4.4	1.0
New Bedford . . . . .	214	26.6	1.9	65.4	2.3	1.9	1.9
Newton . . . . .	10	40.0	0.0	50.0	10.0	0.0	0.0
Pondville . . . . .	608	31.6	12.0	49.0	5.3	1.8	0.3
Springfield . . . . .	141	14.9	10.6	58.9	14.2	1.4	0.0
Worcester . . . . .	212	36.8	2.8	52.4	8.0	0.0	0.0
Worcester North . . . . .	120	14.2	11.7	66.6	7.5	0.0	0.0
Totals . . . . .	2,499	25.5	7.2	57.0	7.5	2.0	1.0

TABLE IV. — *Duration of Symptoms, by Months*

	1928	1929	1930
Median interval between first symptoms and first visit to physician for cancer patients . . . . .	6.1	6.6	6.7
Median interval between first symptoms and first visit to clinic for cancer patients . . . . .	11.8	12.6	12.1

TABLE V. — *Median Duration before First Visit to Physician, by Location of Cancer*

LOCATION OF CANCER	Median Duration in Months
Buccal and Oesophagus . . . . .	5.5
Stomach . . . . .	6.1
Uterus . . . . .	3.8
Skin . . . . .	14.5
Breast . . . . .	4.8
All Others . . . . .	5.8
Total . . . . .	6.7

TABLE VI. — *Median Duration before First Visit to Clinic, by Location of Cancer*

LOCATION OF CANCER	1928	1929	1930
Buccal and Oesophagus . . . . .	9.9 months	8.9 months	6.8 months
Stomach . . . . .	7.9 months	7.0 months	9.0 months
Uterus . . . . .	8.4 months	6.4 months	5.5 months
Skin . . . . .	Over 2 years	Over 2 years	24.4 months
Breast . . . . .	8.9 months	8.1 months	6.8 months
All Others . . . . .	10.5 months	8.3 months	9.9 months
Total . . . . .	11.8 months	12.6 months	12.2 months

TABLE VII. — *Reason for Coming to Clinic, by Diagnosis\**

[Rate per 100]

		Physician	Friends and Relatives	Newspapers	All Others
Cancer . . . . .	1928	54.4	10.5	27.4	10.0
	1929	56.1	13.3	16.5	14.3
	1930	56.9	10.8	17.8	16.2
Precancerous . . . . .	1928	32.3	9.3	51.5	9.3
	1929	37.2	14.5	40.0	9.0
	1930	45.3	13.4	27.9	17.3
Other Conditions . . . . .	1928	18.9	18.1	52.1	13.4
	1929	26.2	18.8	42.9	13.2
	1930	26.8	18.1	36.7	21.1
Deferred . . . . .	1928	41.9	14.8	37.6	12.2
	1929	24.1	21.3	37.1	18.5
	1930	28.6	24.5	26.5	24.5
Undiagnosed . . . . .	1928	25.0	25.0	37.5	12.5
	1929	19.7	13.6	58.5	14.3
	1930	24.2	21.9	38.3	15.6
Normal . . . . .	1928	28.9	15.5	43.8	13.9
	1929	29.3	15.4	46.0	12.4
	1930	34.3	17.4	35.4	13.6
Total . . . . .	1930	36.0	15.9	31.6	19.1

\*Does not total to 100 per cent, as some individuals gave more than one reason.

TABLE VIII. — *Reason for Coming to Clinic, by Individual Clinic, 1930\**

CLINIC	[Rate per 100]			
	Physician	Friends and Relatives	Newspapers	All Others
Berkshire . . . . .	31.9	14.5	52.1	17.4
Boston Dispensary . . . . .	25.0	16.4	3.4	55.8
Brockton . . . . .	23.9	9.2	64.8	4.9
Franklin County . . . . .	22.2	22.2	50.0	11.1
Lawrence . . . . .	29.1	9.7	47.0	16.4
Lowell . . . . .	12.8	29.0	52.3	11.0
Lynn . . . . .	24.9	13.7	41.9	21.0
New Bedford . . . . .	41.6	7.9	35.0	15.9
Newton . . . . .	70.0	0.0	30.0	0.0
Pondville . . . . .	64.1	17.9	2.3	17.6
Springfield . . . . .	24.1	13.5	49.6	12.8
Worcester . . . . .	43.4	9.4	19.8	28.3
Worcester North . . . . .	24.2	8.3	62.5	7.5
Total . . . . .	36.0	15.9	31.6	19.1

\*Does not total to 100 per cent, as some individuals gave more than one reason.



TABLE IX. — *Reason for Coming to Clinic, by Location of Cancer\**  
 [Rate per 100]

LOCATION OF CANCER	Physician	Dentist	Social Worker	Nurse	Friends and Relatives	Clergy, Radio, Pamphlets	Newspapers	Lectures	Past Experience	Others
Buccal and Oesophagus	1928 53.0 1929 59.7 1930 57.3	— — 1.3	1.7 2.6 3.9	2.5 1.8 2.6	10.9 14.9 9.9	0.0 0.9 0.7	27.7 10.5 13.1	0.8 0.0 0.0	1.7 7.0 5.3	2.5 2.6 2.6
Stomach	1928 75.0 1929 36.4 1930 47.4	— — 0.0	0.0 7.9 6.0	0.0 0.0 2.0	8.3 18.2 15.8	0.0 0.0 0.0	8.3 9.1 5.3	0.0 0.0 2.0	0.0 27.2 21.1	8.3 9.1 2.6
Uterus	1928 60.0 1929 75.9 1930 72.2	— 0.0 0.0	5.2 5.2 0.0	1.7 0.0 3.6	8.0 5.6 5.6	0.0 0.0 0.0	24.0 10.3 11.1	2.0 0.0 0.0	2.0 1.7 11.1	0.0 0.0 0.0
Skin	1928 52.1 1929 45.9 1930 47.4	— — 0.0	1.2 1.4 2.4	2.9 4.7 1.1	10.0 18.2 12.4	3.0 0.0 0.6	30.8 23.0 26.0	0.6 0.0 0.0	0.0 8.1 6.5	1.2 0.5 1.8
Breast	1928 50.5 1929 52.2 1930 55.6	— — 0.0	6.6 5.6 2.3	1.4 5.7 2.5	9.9 8.5 15.9	0.0 1.4 0.0	28.6 22.5 15.9	1.1 1.4 1.1	1.1 7.0 6.8	1.1 0.0 0.0
All Others	1928 58.6 1929 71.5 1930 67.4	— 0.0 0.0	2.5 2.9 3.6	2.5 1.4 2.4	12.5 7.1 7.1	0.0 0.0 0.6	22.5 7.1 13.0	1.3 0.0 0.0	1.3 10.0 4.7	2.5 1.4 1.8
Total	1928 54.3 1929 56.0 1930 56.9	— — 0.3	2.9 2.8 3.3	2.5 2.1 3.3	10.4 13.3 10.8	1.0 0.4 0.5	27.2 16.5 17.8	1.0 0.2 0.2	1.0 7.7 6.9	1.7 1.1 1.7

\*Does not total to 100 per cent, as some individuals gave more than one reason

TABLE X. — *Location of Cancer*

[Rate per 100]

LOCATION OF CANCER	MALES				FEMALES				TOTALS			
	1927	1928	1929	1930	1927	1928	1929	1930	1927	1928	1929	1930
Buccal and Oesophagus	43.8	39.9	36.1	38.6	6.9	5.5	5.8	9.7	23.8	21.9	21.3	24.0
Stomach .	4.1	3.4	3.3	7.7	2.9	0.8	0.8	4.4	3.4	2.0	2.1	6.0
Uterus .	0.0	0.0	0.0	0.0	14.9	17.1	22.3	5.6	8.2	8.9	10.9	2.8
Skin .	37.0	43.7	47.4	31.0	23.7	29.2	30.4	22.4	29.8	36.1	39.1	26.6
Breast .	2.0	0.9	0.7	0.0	37.0	29.2	26.5	27.4	21.0	15.7	13.3	13.9
All Others .	13.1	12.0	12.5	22.7	14.5	18.2	14.3	30.5	13.8	15.3	13.3	26.7

TABLE XI. — *Contact of Cancer Patients with Physician, by Location of Cancer*

[Rate per 100]

LOCATION OF CANCER					No Physician	One Physician	Two or More Physicians	
Buccal and Oesophagus	.	.	.	.	1928	16.7	48.3	35.1
					1929	19.6	50.0	30.4
					1930	17.8	49.3	32.9
Stomach	.	.	.	.	1928	7.1	64.3	28.6
					1929	0.0	27.3	72.7
					1930	15.8	44.8	39.4
Uterus	.	.	.	.	1928	14.9	46.8	38.3
					1929	10.5	56.2	33.3
					1930	16.7	55.5	27.8
Skin	.	.	.	.	1928	20.2	47.9	31.9
					1929	30.7	43.9	25.4
					1930	31.4	44.4	24.2
Breast	.	.	.	.	1928	20.0	55.6	24.4
					1929	23.2	40.6	36.2
					1930	27.3	52.3	20.4
All Others	.	.	.	.	1928	17.3	45.4	37.3
					1929	10.0	50.0	40.0
					1930	11.3	52.6	36.1
Total	.	.	.	.	1928	18.1	49.3	32.6
					1929	21.8	46.5	31.7
					1930	20.8	49.0	30.2

TABLE XII. — *Symptoms that Brought Patient to Clinic, by Diagnosis*<sup>1</sup>  
[Rate per 100]

SYMPTOM	CANCER			PRECANCEROUS			OTHER CONDITIONS			DEFERRED			UNDIAGNOSED		NORMAL			TOTAL		
	1928	1929	1930	1928	1929	1930	1928	1929	1930	1928	1929	1930	1928	1930	1928	1929	1930	1928	1929	1930
Swelling . . . . .	36.3	44.7	33.6	31.3	42.8	18.4	38.2	43.2	38.7	21.5	35.2	32.6	37.5	31.1	35.2	30.5	35.4	42.7	35.2	
Ulceration . . . . .	31.6	27.1	33.0	22.7	16.3	27.4	7.2	6.4	10.5	5.2	4.6	2.0	8.3	6.0	6.3	3.7	13.0	12.3	16.8	
Discharge and bleeding . . . . .	24.1	27.4	15.9	10.4	20.4	14.0	16.7	17.9	16.4	28.3	33.3	18.4	12.5	16.6	11.7	8.0	18.9	20.9	15.5	
Pain . . . . .	24.9	24.1	26.2	11.7	12.2	14.0	49.5	45.9	42.2	55.8	63.0	46.9	41.6	51.6	38.3	42.3	42.7	38.5	36.2	
Deformity . . . . .	2.1	2.2	7.1	3.1	3.4	31.3	0.9	1.9	8.6	1.7	1.9	2.0	8.3	0.0	2.3	1.1	1.3	2.1	9.1	
Loss of weight . . . . .	8.9	8.1	6.9	1.8	1.4	0.6	10.8	8.2	8.1	18.0	13.9	14.3	4.2	8.6	7.8	3.7	10.4	7.9	7.1	
Malaise . . . . .	5.1	7.3	3.9	1.8	3.4	1.7	9.4	7.3	6.7	11.6	9.3	8.2	12.5	7.3	7.0	3.2	8.1	7.1	5.5	
Itching . . . . .	4.6	10.3	5.5	6.1	10.2	4.5	5.3	6.1	3.6	2.6	1.9	6.1	0.0	7.3	5.5	1.6	5.1	7.2	4.0	
Scaly Skin . . . . .	7.2	6.6	3.1	22.7	22.4	8.9	3.0	3.2	1.0	1.7	4.6	2.0	0.0	0.7	2.3	1.6	4.9	5.4	2.2	
Others . . . . .	0.6	0.4	3.3	4.3	0.7	2.2	0.3	0.4	3.7	0.9	0.0	6.1	12.5	0.7	2.3	7.5	0.7	0.5	3.9	
Observation <sup>2</sup> . . . . .	—	—	1.4	—	—	0.6	—	—	0.8	—	—	4.1	0.0	—	—	—	—	—	1.9	
Unknown or None . . . . .	1.5	2.1	0.2	2.5	2.0	0.0	2.5	1.9	0.3	4.3	0.0	0.0	0.0	7.3	7.8	0.0	2.8	2.2	0.2	

<sup>1</sup> Does not total to 100 per cent as multiple symptoms were given by some patients.

<sup>2</sup> Individuals who were treated at hospital and came to the clinic for observation.



TABLE XIII. — *Nationality of Individual by Individual Clinic*

[Rate per 100]

Clinic	United States	Ireland	Russia-Poland	Italy	Britain	Teutonic	Scandinavia	Latin	Canada	Baltic	Others	Unknown
Berkshire	1928 58.9 1929 73.2 1930 78.2	7.8 5.6 5.8	5.6 4.5 4.3	7.8 1.1 2.0	2.2 3.4 1.5	3.3 1.1 0.0	0.0 1.1 1.5	7.8 0.0 1.5	5.5 4.6 1.5	0.0 0.0 0.0	1.1 1.1 1.5	0.0 2.3 1.5
Boston Dispensary	1928 47.9 1929 48.1 1930 42.4	16.4 12.5 17.8	11.0 10.6 8.7	0.0 5.3 3.4	8.2 4.3 2.8	0.0 1.4 1.9	0.0 0.5 7.1	1.4 1.0 0.7	10.9 12.0 11.3	1.4 2.4 0.7	1.4 4.8 0.0	0.0 1.9 0.0
Brockton	1928 69.0 1929 82.9 1930 90.5	3.5 2.6 0.0	2.1 5.3 3.8	2.1 0.0 0.0	4.8 5.3 1.9	0.7 1.3 3.8	7.1 0.0 0.0	0.0 0.0 0.0	0.0 0.0 19.4	1.3 0.0 0.0	1.3 0.0 0.0	0.0 0.0 0.0
Franklin County	1928 66.6 1929 40.6 1930 44.8	2.8 8.7 8.0	0.0 4.4 6.5	2.8 8.7 3.3	5.6 14.5 8.9	2.8 2.9 8.9	0.0 1.5 0.8	0.0 1.5 0.0	14.4 17.1 11.2	2.9 0.8 0.7	0.0 0.0 0.0	0.0 0.0 0.0
Lawrence	1928 56.0 1929 42.4 1930 52.0	8.4 9.0 7.8	4.5 6.2 2.0	6.7 0.0 0.3	6.6 4.5 3.7	1.5 0.0 0.8	1.1 0.6 0.5	7.5 3.9 3.7	22.9 28.5 19.3	1.1 0.6 1.0	2.4 1.1 2.3	0.0 0.0 0.0
Lowell	1928 59.6 1929 60.5 1930 71.7	6.6 6.2 3.4	4.8 3.5 2.9	1.6 2.0 2.0	3.4 5.5 2.9	0.3 0.5 0.0	1.6 0.5 0.5	0.0 0.0 0.0	19.1 14.6 18.5	0.4 0.0 0.4	0.0 0.0 0.7	0.8 0.5 0.0
Lynn	1928 42.4 1929 45.8 1930 46.2	2.5 3.9 2.8	1.4 3.9 2.8	0.7 0.0 0.9	16.4 19.4 20.1	0.0 1.9 0.5	0.0 1.3 0.0	17.1 9.0 10.3	12.9 13.1 28.5	0.0 0.0 0.0	1.9 3.3 0.0	0.0 0.0 0.0
New Bedford	1928 50.0 1929 60.0 1930 64.0	0.0 10.0 6.3	0.0 0.0 2.1	0.0 0.0 1.9	0.0 10.0 5.4	0.0 1.9 1.8	0.0 3.5 2.9	0.0 0.8 0.5	50.0 20.0 11.5	0.0 0.0 0.4	0.0 2.1 1.1	0.0 0.0 0.5
Newton	1928 66.2 1929 65.0 1930 69.3	6.0 5.4 3.6	0.9 1.3 5.0	2.2 2.0 1.9	5.8 5.9 5.0	1.8 1.3 0.6	2.9 1.2 0.0	0.7 0.7 1.4	11.9 12.3 9.9	0.2 1.5 0.0	1.3 2.9 1.2	0.3 0.0 0.0
Pondville	1928 73.3 1929 66.7 1930 64.3	4.4 5.7 6.2	4.3 6.4 2.1	1.4 3.3 4.1	5.0 2.2 4.1	1.4 2.2 0.7	0.7 5.0 2.8	0.6 5.0 4.1	8.3 10.2 9.0	1.7 2.1 3.3	3.3 0.9 0.3	0.0 0.5 0.0
Springfield	1928 59.7 1929 60.8 1930 52.1	9.4 9.4 2.0	2.1 3.3 2.3	4.1 2.8 0.9	5.7 3.3 4.6	0.9 0.7 1.8	2.8 0.9 0.0	0.5 1.0 0.0	22.8 15.6 18.3	12.7 23.9 15.0	0.3 0.9 0.0	0.0 0.0 0.0
Worcester	1928 48.7 1929 55.8 1930 54.8	0.9 5.0 6.1	0.9 0.0 4.0	0.9 1.7 1.7	4.6 3.3 6.3	0.8 1.8 1.2	1.8 0.0 1.7	0.0 0.0 3.9	16.5 15.2 14.1	2.3 1.8 1.8	1.7 0.9 1.6	0.0 0.5 0.2
Worcester North	1928 58.6 1929 59.5 1930 54.8	6.6 6.5 5.8	3.5 3.1 4.0	1.9 2.0 1.7	6.1 6.3 3.3	1.7 1.3 0.8	1.5 1.3 0.0	1.7 2.5 0.0	15.2 14.1 16.5	1.8 1.8 2.3	0.9 1.6 1.7	0.5 0.2 0.0
Total	1928 54.8 1929 58.6 1930 59.5	6.1 6.6 5.8	4.0 3.5 3.1	1.7 1.9 2.0	6.3 6.1 6.3	1.2 1.7 1.3	1.7 1.5 1.3	3.9 1.7 2.5	16.5 15.2 14.1	2.3 1.8 1.8	1.7 0.9 1.6	0.0 0.5 0.2

TABLE XIV. — *Type of Treatment Recommended, by Location of Cancer, 1930*

[Rate per 100]

LOCATION OF CANCER	Operation	Radiation	Operation and Radiation	Observation	Study	Advice	Medical Treatment
Buccal and Oesophagus	32.9	51.4	9.9	0.7	1.3	0.0	3.9
Stomach	15.8	7.9	0.0	13.2	15.8	13.2	34.2
Uterus	27.8	44.4	5.6	0.0	11.1	0.0	11.1
Skin	23.1	68.0	7.1	0.6	1.2	0.0	0.0
Breast	59.1	27.3	12.5	0.0	1.1	0.0	0.0
All Others	32.6	42.6	8.3	4.7	6.5	1.2	4.1
Total	32.5	47.4	8.3	2.4	3.9	1.1	4.4

TABLE XV. — *Recommendation for Place of Treatment for Cancer Patients, by Location of Cancer*

[Rate per 100]

LOCATION OF CANCER		Pondville	Local Hospital	Other Institutions	Local Physician	Clinic	Unknown
Buccal and Oesophagus	1928	46.2	18.5	14.3	15.1	5.9	0.0
	1929	39.5	19.3	9.6	15.8	15.8	0.0
	1930	33.6	28.9	10.5	8.6	16.4	2.0
Stomach	1928	42.9	28.6	0.0	14.3	7.1	7.1
	1929	27.3	27.3	9.1	27.3	9.1	0.0
	1930	31.6	23.7	0.0	18.4	7.9	18.4
Uterus	1928	46.0	34.0	8.0	4.0	4.0	4.0
	1929	36.2	44.8	1.7	5.2	8.6	3.5
	1930	44.4	33.3	5.6	5.6	5.6	5.6
Skin	1928	42.7	17.5	14.0	16.4	9.4	0.0
	1929	21.5	18.2	16.3	13.9	29.6	0.5
	1930	24.8	29.0	8.3	12.4	25.4	0.0
Breast	1928	34.8	35.8	4.3	19.6	2.2	3.3
	1929	28.2	36.6	8.5	21.1	5.6	0.0
	1930	39.8	46.6	4.5	5.7	3.4	0.0
All Others	1928	40.0	32.5	13.8	10.0	2.5	1.3
	1929	33.8	28.2	9.9	14.1	9.9	4.2
	1930	42.0	32.6	4.7	10.1	8.3	2.4
Total	1928	42.0	25.1	11.4	14.5	5.7	1.3
	1929	29.6	25.3	11.2	14.6	18.2	1.1
	1930	34.6	32.1	6.8	10.1	14.2	2.4

TABLE XVI. — *Cancer Morbidity in State-Aided Cancer Clinics, by Occupation — 1929 and 1930*

OCCUPATION	Cancer Morbidity Rate per 1,000	Median Duration of Symptoms Before First Visit to Clinic, by Months	Median Age of Cancer Patients, by Years
Student	30 ± 14.7	*	*
Housewife	201 ± 8.7	11.0	57.4
Clerk, Stenographer, and Salesperson	225 ± 31.8	14.3	50.0
Factory Worker	262 ± 23.2	13.8	63.2
All Other Occupations	293 ± 13.7	10.8	61.4
Unknown	300 ± 83.7	8.3	72.5
No Occupation	364 ± 25.4	15.3	71.8
Carpenter	445 ± 55.2	11.0	66.5
Farmer	451 ± 55.0	24.0	64.3
Laborer	493 ± 43.8	8.8	63.1

\*Too few cases upon which to base median.

TABLE XVII. — *Diagnosis, 1930*

[Rate per 100]

## DIAGNOSIS

Rate per 100

Cancer primary	18.7
Cancer with metastases	4.1
Cancer recurrent following operation	2.7
Hodgkins disease	0.3
Benign tumor	14.1
Precancerous lesions	7.2
Diseases of the digestive system	7.5
Diseases of the cardiovascular system	2.2
Diseases of the genitourinary system	5.8
Mouth lesions	3.0
Diseases of the skin	7.3
All others	5.2
Noncancerous, diagnosis not established	11.6
Normal	7.5
Deferred	2.0
Undiagnosed	1.0

TABLE XVIII. — *Type of Cancer, by Location of Cancer*

[Rate per 100]

LOCATION OF CANCER	Operable Cancer Probable Cure	Operable Cancer Possible Cure	Operable Cancer Palliative Measures Only	Inoperable Cancer
Buccal and Oesophagus	51.4	23.3	11.3	14.0
Stomach	2.6	10.5	18.4	68.5
Uterus	22.2	33.3	16.7	27.8
Skin	81.6	12.4	3.6	2.4
Breast	20.5	43.2	17.0	19.3
All Others	23.4	29.9	23.4	23.4
Total	44.0	24.4	13.8	17.8



## REPORT OF DIVISION OF BIOLOGIC LABORATORIES

BENJAMIN WHITE, PH.D., *Director*ELLIOTT S. ROBINSON, M.D., PH.D., *Assistant Director*

## I. ANTITOXIN AND VACCINE LABORATORY

The three most important features of the year have been:

1. The taking over by this laboratory from the State House the distribution of all biological and arsenical products.

2. The carrying out of original investigations on problems related to serums and vaccines.

3. The unavoidable and unfortunate turnover among the members of the professional staff, due to the small salaries allowed.

Each one of these features will be discussed in its proper place.

1. *Distribution of Products*

The following table shows the amounts of the various products distributed each year for the past five years:

	1926	1927	1928	1929	1930
Diphtheria Antitoxin, 1,000 unit doses . . . . .	296,591	346,212	321,202	313,736	272,114
Antimeningococcic Serum, 15 cc. doses . . . . .	2,451	2,837	3,643	4,521	5,236
Antimeningococcic Serum, 15 cc. doses (Conc.) . . . . .	-	-	-	-	142
Antimeningococcic Serum, bulk cc. . . . .	-	-	-	-	7,200
Antipneumococcic Serum, 100 cc. doses . . . . .	247	185	173	96	1
Antipneumococcic Serum, Conc. 15 cc. doses . . . . .	-	-	19	740	1,075
Smallpox Vaccine Virus, capillary tubes . . . . .	298,834	294,983	320,091	434,621	326,762
Typhoid-Paratyphoid Vaccine, 1 cc. doses . . . . .	88,842	108,387	104,215	84,205	93,035
Schick Outfits, 50 doses each . . . . .	5,031	5,492	5,747	6,419	8,375
Diphtheria Toxin (Bulk) cc. . . . .	350	630	430	485	675
Diphtheria Toxin-Antitoxin Mixture, 1 cc. doses . . . . .	205,589	332,463	356,739	354,845	412,308
Scarlet Fever Streptococcus Antitoxin, doses . . . . .	3,712	6,114	5,569	4,978	4,790
Normal Serum, cc. . . . .	9,865	23,585	118,150	675,715	177,400
Silver Nitrate Solution (ampoules) . . . . .	-	12,148	69,663	61,736	51,167
Anti-Measles-Diplococcus Serum, bottles . . . . .	-	104	114	99	3
Influenza Serum, bottles . . . . .	-	26	10	32	173
Tuberculin (ampoules) . . . . .	-	-	-	-	5
Diagnostic Serum, cc. Pneumococcus I . . . . .	-	-	-	-	105
" " " " II . . . . .	-	-	-	-	55
" " " " III . . . . .	-	-	-	-	50
" " " Typhoid . . . . .	-	-	-	-	2
" " " Paratyphoid A . . . . .	-	-	-	-	21½
" " " Paratyphoid B . . . . .	-	-	-	-	21½
Arsphenamine, 0.4 gram (ampoules) . . . . .	-	-	-	-	223*
" " 0.6 " " . . . . .	-	-	-	-	440*
" " 2.0 " " . . . . .	-	-	-	-	100*
" " 3.0 " " . . . . .	-	-	-	-	1,040*
" " 0.3 " " . . . . .	-	-	-	-	500*
Sulpharsphenamine, 0.3 gram (ampoules) . . . . .	-	-	-	-	1,280*
" " 0.4 " " . . . . .	-	-	-	-	1,337*
" " 0.6 " " . . . . .	-	-	-	-	3,600*
" " 1.0 " " . . . . .	-	-	-	-	633*
" " 3.0 " " . . . . .	-	-	-	-	340*
Neosarsphenamine, 0.45 gram (ampoules) . . . . .	-	-	-	-	3,616*
" " 0.6 " " . . . . .	-	-	-	-	10,128*
" " 0.9 " " . . . . .	-	-	-	-	3,037*

\*Distributed since July, 1930.

(a) *Diphtheria Antitoxin*. — As might be expected, because of the low incidence of diphtheria, the distribution of diphtheria antitoxin has shown a considerable decrease. In spite of the small number of cases now being reported, ample stocks of this product are kept on hand in anticipation of a possible rise of cases during the next year.

(b) *Antimeningococcic Serum*. There was an appreciable increase in the distribution of this product owing to the greater prevalence of the disease in the early part of the year.

(c) *Antipneumococcic Serum*. — Although the distribution of this serum has been largely restricted to hospitals cooperating in a clinical study of this product, the distribution has increased by nearly fifty per cent. During the latter part of the year it was decided to limit the distribution of this product solely to hospitals cooperating in the pneumonia study.

(d) *Smallpox Vaccine Virus*. — With the exception of the year 1929, during which the Middleboro epidemic occurred, the distribution for 1930 sets a high record for this product. It may be assumed, therefore, that there is no falling off in the number of vaccinations in this State, but probably an actual increase in general vaccination.

(e) *Typhoid-Paratyphoid Vaccine*. — This product shows an increase over the previous year and, with the exception of the two years in which large shipments of this product were made to the flooded areas, represents a record distribution.

(f) *Schick Outfits*. — It is most gratifying to note the record number of Schick outfits distributed during this year. A glance at the above table will show almost a thirty per cent increase over the distribution of 1929, which also was a record year.

(g) *Diphtheria Toxin-Antitoxin Mixture*. — It is also gratifying to note the increased number of doses of this product distributed in 1930, which represents the largest amount of this product distributed during any year since it has been supplied by this laboratory. The greatly increased use of Schick outfits and of this product should be reflected in a decreased incidence of diphtheria in the State.

(h) *Scarlet Fever Streptococcus Antitoxin*. — The last three years have seen a decline in the amounts of this product requested. This may be due to the decreased virulence of the disease and the inclination of physicians to give this product only in the moderately severe and severe cases.

(i) *Silver Nitrate Ampoules*. — There is a slight falling off in this product but it may be expected that with slight variations the amount distributed should remain fairly constant.

For the first time, the report shows the distribution of agglutinating serum for the three types of pneumococcus and for typhoid, paratyphoid A and B bacilli. A few vials of a new product, Old Tuberculin "O.T." for diagnostic use were also sent out during this year.

Taken as a whole, therefore, distribution shows an increase over previous years with the addition of several new items.

## 2. Expenses

YEAR	PERSONAL SERVICES		EXPENSES		TOTAL	
	Appropriation	Spent	Appropriation	Spent	Appropriation	Spent
1926 . . .	\$46,000 00	\$45,025 29	\$31,184 94	\$30,747 71	\$77,184 94	\$75,773 00
1927 . . .	50,355 00	50,261 54	34,611 11	34,579 87	84,966 11	84,841 41
1927 <sup>1</sup> . . .	—	—	29,500 00	29,488 68	29,500 00	29,488 68
1928 . . .	59,000 00	58,919 09	38,005 37	37,955 34	97,005 37	96,874 22
1929 . . .	63,400 00	63,392 26	39,560 48	39,261 97	102,960 48	102,654 23
1930 . . .	67,700 00	67,698 66	42,412 45	42,243 09	110,112 45	109,941 75

<sup>1</sup>Special appropriation for purchase and installation of equipment.

(a) *Expenses*. — In the above table it will be seen that the greatest increase is on the personal service account, while the amount spent for actual expenses has not grown in proportion to the increase of work. During the year many items have been restudied and purchases have been made even more advantageously than in previous years. It is believed that the present sources of supplies are as favorable as can be found anywhere. The system of purchasing supplies in six or twelve months' quantities on competitive bids and at favorable times of the year has resulted in some handsome savings on this account. In addition to making these savings, new means for effecting economies have been introduced into the laboratory. It has been found that with larger salaries for the non-professional staff, far greater care is exercised in the care and handling of apparatus and equipment and in the use of supplies. Thus the extra money given for salaries has proved to be a most profitable investment.

(b) *Sales of Products*. — In order that this laboratory may continue to be eligible to be licensed by the United States Treasury Department, some sales of products outside the State have been made as in previous years. While this laboratory has no intention to compete with commercial laboratories, certain health officers from time to time desire some of the products of this laboratory and they have been supplied with them. The small receipts from the sales of products, according to law, are credited to the State Sinking Fund.

(c) *Salaries*. — The salaries that are now paid to the members of the non-professional staff are entirely satisfactory and represent excellent compensation for the quality of the work done. On the other hand, the present salary ranges for the members of the professional staff are still much too low and cause great difficulties in the proper administration of the laboratory. During the past year this

laboratory has lost two of its valued members of the professional staff because it was impossible to pay them salaries which would hold them here. The salaries which we are allowed to pay have been insufficient to attract to this laboratory persons of the experience required in this highly specialized field of work. While the members of the Commission on Administration and Finance have been generous in authorizing beginning salaries somewhat higher than the minimum set by their Commission, it still requires a long and wide search to find properly qualified employees who would be attracted by the present salaries. Therefore, if we are to secure the proper type of bacteriologists and chemists, and if we are to hold these workers for any length of time, the salary scales for all members of the professional staff above the grade of Junior Bacteriologist or Junior Chemist must be revised upward. It should be borne in mind that because of the responsibility entailed in the production of biologic products, it is essential that highly trained workers be obtained and that they be held here long enough to take an active and continuing part in the activities of the laboratory. While there may be some satisfaction in knowing that there is always a demand for professional workers trained in this laboratory, the satisfaction is an empty one because our inability to make the positions attractive enough for these workers to remain throws an unduly severe burden upon the Director and Assistant Director. Steps have already been taken toward establishing higher salary grades for members of the professional staff, and the organization of the laboratory can not be said to be satisfactory until these higher grades are established.

### 3. *Improvements*

Many minor improvements have been made in the physical equipment of the laboratory which lead to greater convenience and to the saving of time and to greater efficiency. There is now a well equipped metal working department, which already has effected appreciable savings.

Constant improvements are being made not only in the packages of products but also in the products themselves and work carried out during the past year will lead to still further improvements in the products distributed in 1931 and subsequently.

A change of policy which, while it lays a slight additional burden on the Department should facilitate the distribution of products to physicians, is the elimination of all postal or express charges on shipments going from this laboratory.

The physical condition of the buildings, through the cordial cooperation of the maintenance department of Harvard University, has been kept at its usual high standard.

### 4. *Personnel*

Owing to the resignation of Dr. Goodner, Senior Bacteriologist, to take a position at the Rockefeller Institute and the resignations of Miss Jost, Assistant Bacteriologist, of Miss Clarice McDougall and Miss Elizabeth McDougall, as Junior Bacteriologists, an entirely new department of bacteriology has had to be recruited. We have been most fortunate in securing from the National Institute of Health, Dr. W. G. Malcolm as Senior Bacteriologist, Miss Sylvia Johnson from Leland Stanford University as Assistant Bacteriologist, and Miss Wyman and Miss Wetherlow from Simmons College as Junior Bacteriologists. With the appointment of these new workers many features of the work have been re-allocated, with consequent improvement in the ease and effectiveness of the work.

In taking over the distribution of biological and arsenical products from the State House, it has been necessary to add to the staff two Junior Messengers, female, and one Junior Messenger, male. This change brings the distribution of all products, with the exception of a few emergency supplies held at the State House, under a single packing and distributing department in this laboratory. With this new arrangement certain economies were effected and a duplication of records and reports has been eliminated.

The personnel of the laboratory at present is made up as follows: — 1 Director, 1 Assistant Director, 3 Senior Bacteriologists, 1 Assistant Bacteriologist, 2 Junior Bacteriologists, 1 Senior Chemist, 1 Assistant Chemist, 1 Principal Clerk and Stenographer, 1 Senior Clerk, 1 Junior Clerk, 2 Laboratory Assistants, 9 Laboratory Helpers, 13 Laborers, 2 Janitors, 1 Stable Foreman, 3 Junior Messengers.



### 5. Educational Activities

The regular course in applied immunology given in connection with the Harvard School of Public Health was held as usual and with an attendance of five students. As in previous years demonstrations have been given to classes of medical students from Harvard, Tufts, Boston University and Middlesex, to nurses, teachers and college and school students, with an attendance of 372. Owing to the illness of the Director, the demonstrations usually given to classes of nurses had to be given up during the winter and spring, but were resumed in the autumn.

During the year two students in the special course for laboratory technicians given by Simmons College have received training in this laboratory and one of these students was secured for the professional staff. One graduate student from the Harvard School of Public Health spent practically the whole year in this laboratory studying the methods for the production of biologic products and also in an original investigation with the Senior Chemist on some features of diphtheria toxin.

### 6. Lectures and Addresses

The Director and Assistant Director have each participated in the course of lectures on Immunity at the Harvard Medical School and in a course given under the joint auspices of the Department of Preventive Medicine and the Department of Pediatrics of the Harvard Medical School. The Assistant Director has also participated in the course on Public Health of the Tufts Medical School. One session on smallpox vaccine was given during the summer in the Public Health Course in the Massachusetts Institute of Technology. As in former years addresses have been given before various medical groups. Visitors who were scientific or public health workers from the following countries visited the laboratory during the year: Canada, China, England, Czechoslovakia, Mexico, and Ireland.

### 7. Investigations

(a) Dr. Bunney, the Senior Chemist, has continued his studies on diphtheria toxin, and as a result of his studies has prepared the following five papers which will shortly come to publication:

1. William E. Bunney and Benjamin White: Advantages and disadvantages of the buffered diluent for diphtheria toxin.
2. William Edward Bunney: A new diluent for diphtheria toxin in the Schick test.
3. William Edward Bunney: The action of formaldehyde on diphtheria toxin.
4. William E. Bunney and Mumtaz Kiamil: The speed of flocculation of diphtheria toxin.
5. William E. Bunney, J. Cianciarulo and Mumtaz Kiamil: A study of the acid precipitation of diphtheria toxin.

As a result of Dr. Bunney's studies, a way has been found to stabilize diphtheria toxin diluted to Schick strength. The facts developed in this study are of fundamental importance in our knowledge of the nature of diphtheria toxin and they have a very practical application in making it possible to distribute to physicians diphtheria toxin ready-diluted for use. This improvement not only makes it possible to supply physicians with a far more convenient Schick outfit and one which should result in much greater accuracy in the test, but it also leads to a very marked saving in the cost of producing these outfits.

(b) Another result of Dr. Bunney's studies has been the development of a method for purifying diphtheria toxin and of producing from this toxin a purified toxoid. This method makes it possible to utilize low grade toxin for the production of toxoid, as well as to develop an immunizing agent against diphtheria which is inexpensive to make, has high antigenic potency and should be free from many of the objections which apply to diphtheria toxin-antitoxin mixture or to the present preparations of toxoid. This method is being further studied with a view to the production of purified toxoid.

(c) Dr. Goodner, following the work of Felton and others, has developed a simple method for the concentration of antipneumococcic and antimeningococcic serums. While this method might be considered as a tentative one, it forms the basis for further studies which should result in a great lowering of the cost of concentration

and a raising of the potency of these two serums. This study came to publication under the title "Experiments on the concentration of antipneumococcic and antimeningococcic horse sera" in the Journal of Immunology. Antipneumococcic serum and antimeningococcic serum prepared by Dr. Goodner's method have been put to clinical trial and the results so far are encouraging to further study.

(d) With the appearance of a virulent type of meningococcus meningitis in San Francisco, Indianapolis, Chicago, and Detroit, this laboratory has sent samples of the serum to various hospital laboratories in those cities for bacteriological and clinical tests. Shipments of this serum have also been made to hospitals in New York City and from the reports obtained it would seem that the lots of serum produced in this laboratory have a wide antigenic coverage and show gratifying results in clinical trials, if we except some fulminating cases which apparently fail to respond to serum treatment.

(e) Continued studies on various phases of antitoxin concentration have resulted in a more refined product.

(f) Preliminary experiments have been carried out with a view to developing methods for increasing the potency of antipneumococcic and antimeningococcic serums. The results so far are sufficiently encouraging to warrant the continuation of these studies.

Through the cooperation of the Meningococcus Meningitis Service established by this Department in connection with the Department of Pediatrics of the Children's Hospital, it is now possible to study the therapeutic effect of the lots of antimeningococcic serum prepared at this laboratory. Cultures are taken from the spinal fluid at the bedside and are studied in connection with the various lots of serum produced. It is now planned to enlist the interest of bacteriologists and serologists not only in Boston, but in other laboratories, with a view to carrying out a coordinated study of the bacteriology of meningococcus, and of antimeningococcus immunity. With the cooperation of the Meningitis Service and of clinicians in the various hospitals in Boston, it will now be possible to make a well rounded study of meningococcus and its anti-serum in relation to meningococcus meningitis.

### 8. *New Products*

1. For the convenience of clinical laboratories throughout the State, agglutinating serums against pneumococcus Types I, II, and III and against the typhoid bacilli and paratyphoid bacilli A and B have been prepared for distribution.

2. At the request of the Director of the Division of Tuberculosis, three lots of Old Tuberculin "O.T." have been prepared and were first distributed during the past year. Because of the great variability in this product as obtained from various sources, attempts at standardizing this product have been made by carrying out comparative intradermal tests on susceptible adults using a standard lot of the Saranac Lake Laboratory as a control. According to this method, the three lots so far tested have a potency somewhat greater than that of the Saranac Lake product.

### 9. *Publications*

Goodner, Kenneth: Experiments on the concentration of antipneumococcic and antimeningococcic horse sera. Jour. Immunol., Vol. XIX, Nov. 1930, No. 5, p. 473.

### 10. *Inspection*

Dr. George W. McCoy, Director of the National Institute of Health of the United States Public Health Service, made his usual annual inspection of this laboratory in September. The United States Treasury Department license to manufacture and sell biologic products was continued.

### 11. *Acknowledgment*

The Director wishes to make a record of his deep appreciation of the loyalty and industry of the Assistant Director and all the members of the staff during his long period of illness which necessitated his absence from the laboratory. The work was carried out with complete thoroughness and efficiency and all who cooperated in making this possible deserve the highest commendation.

## II. WASSERMANN LABORATORY

WILLIAM A. HINTON, M.D., *Chief of Laboratory*1. *Tests and Examinations*

	1926	1927	1928	1929	1930
Wassermann Tests . . . . .	64,665	67,700	75,471	81,156	88,675
Kahn Tests . . . . .	1,302	2,644	2,692	3,631	8,389
Hinton Tests . . . . .	—	—	—	—	12,025
Modified Hinton Tests . . . . .	—	—	—	—	12,025
Gonococcus Fixation Tests . . . . .	1,776	1,409	1,860	2,463	2,715
Lange's Colloidal Gold Tests . . . . .	25	35	27	85	57
Complement Fixation Tests for Glanders . . . . .	27	15	37	16	31
Specimens of Milk Examined for Tuberculosis . . . . .	—	46	21	—	—
Complement Fixation Tests for Antimeningococcic Serum . . . . .	79	—	—	—	—
Diagnostic Examinations for the Division of Animal Industry:					
(a) Complement Fixation Tests for Glanders . . . . .	43	33	44	91	66
(b) Examinations for Rabies . . . . .	312	510	546	455	471
(c) Pathologic and Bacteriologic Examinations . . . . .	18	21	24	23	35
(d) Agglutination Tests for Bacillus abortus . . . . .	101	282	822	3,911	7,877
(e) Specimens of Milk Examined for Tuberculosis . . . . .	—	—	—	—	52
Diagnostic Examinations for Lakeville State Sanatorium . . . . .	—	—	5	—	—
	68,348	72,695	81,549	91,831	132,418

In the above table the number of tests shows a 44.1 per cent increase over the number done in the previous year. On the basis of a test as a unit of output, the cost in 1930 was only 16.3 cents compared to 22.4 cents in 1929 and 25.5 cents in 1926. These figures, therefore, represent a 36 per cent reduction in the cost per test in the five year period, in spite of the fact that the salary expenditure for 1930 was \$15,935.42 as compared with \$15,328.92 in 1929 and \$12,186.98 for 1926.

In this table the number of Kahn, Hinton and modified Hinton tests have been included because the results of these examinations have been forwarded to various clinics and hospitals as follows: the State Approved Venereal Clinics at Brockton, Fall River, Fitchburg, Haverhill, Holyoke, Lawrence, Lowell, Lynn, New Bedford, and Springfield, and to the following hospitals: Boston Lying-In, Deaconess, Huntington, Palmer Memorial, Psychopathic, Reformatory for Women, and the Worcester State Hospital.

The purpose of carrying on these comparative tests has been to familiarize the physicians in these various hospitals and clinics with these tests and to allow them to determine for themselves the relative value of the different procedures. In consequence there has been a growing demand for the Hinton test and it seems likely that the day is not far distant when this demand will have to be met by supplying this particular test as a routine. At the present time, however, it does not seem desirable to substitute the Hinton test for the Wassermann or Kahn tests. It seems preferable to await the further results obtained by such a comparative study.

2. *Expenses*

YEAR	PERSONAL SERVICES		EXPENSES		TOTAL	
	Appropriation	Spent	Appropriation	Spent	Appropriation	Spent
1925 . . . . .	\$12,500 00	\$11,984 70	\$6,000 00	\$5,971 18	\$18,500 00	\$17,955 88
1926 . . . . .	12,600 00	12,186 98	5,500 00	5,386 40	18,100 00	17,573 38
1927 . . . . .	12,616 00	12,506 91	5,300 00	5,068 66	17,196 00	17,575 57
1928 . . . . .	14,000 00	13,723 34	5,182 25	5,094 01	19,182 25	18,817 35
1929 . . . . .	15,800 00	15,328 93	5,300 00	5,297 13	21,100 00	20,626 06
1930 . . . . .	16,500 00	15,935 42	5,704 75	5,688 54	22,204 75	21,623 96

The increase in appropriations has been almost exclusively on the account for salaries. While the amount of money spent for personal services has risen from \$11,984.70 in 1925 to \$15,935.42 for 1930, the amount spent for expenses, in spite of the fact of practically a one hundred per cent increase in the number of tests, is nearly \$300 less in 1930 than it was in 1925 and it would have been still lower in 1930 if it had not been necessary to ask for added funds for the abortus tests which are now being done for the Division of Animal Industry. This decreased expenditure has been brought about by increasingly careful buying, and in many and various economies that have been carried out in the laboratory. Many of these



economies have been effected by the added interest and efficiency of all the members of the laboratory staff and here once more we have convincing evidence of the desirability of paying adequate salaries. The increased compensation not only greatly improves the morale of the staff, but it gives them added incentive to avoid wastefulness and breakage and to find new ways for cutting costs.

### *3. Investigations*

Further studies on the Hinton-glycerol-cholesterol reaction for syphilis have been continued with the results already mentioned. Another study on the development of a serum reaction as an aid in the diagnosis of tuberculosis has been continued and the preliminary results have already come to publication. A paper by Dr. William A. Hinton and Genevieve O. Stuart describing this work appeared in the New England Journal of Medicine, Vol. 202, No. 7, p. 327, February 13, 1930.

### *4. Teaching*

As in previous years, this laboratory has been used for teaching purposes both in the Harvard Medical School and the School of Public Health and it has received for training in serology two students from the public health laboratory course given at Simmons College.

## REPORT OF DIVISION OF CHILD HYGIENE

M. LUISE DIEZ, M.D., *Director*

The following brief report covers the activities of the Division of Child Hygiene for the year ending November 30, 1930.

- I. Personnel of the Division.
- II. Appropriation for the Fiscal Year 1929-1930.
- III. Activities of the Various Sections:
  1. *Maternal, Infant and Preschool Hygiene:*
    - (a) Maternity Service
    - (b) Well Child Conferences
    - (c) Summer Round-Up
  2. *School Hygiene:*
    - (a) Legislation
    - (b) Surveys
    - (c) School Hygiene Conferences
    - (d) Salem Normal School
    - (e) Lynn Demonstration
    - (f) Hyannis Normal School Courses
    - (g) Fitchburg Normal School Courses
    - (h) Handbook on School Hygiene
    - (i) Advisory Committee — High School Health Activities
  3. *Public Health Nursing:*
    - (a) Advisory Committee on Public Health Nursing and Social Service
    - (b) Report of Department Consultant in Public Health Nursing
    - (c) Postgraduate Work for Department Consultants
    - (d) Change in Personnel
  4. *Nutrition:*
    - (a) Chadwick Clinics
    - (b) Follow-up Clinic
    - (c) Summer Camps
    - (d) School Lunch
    - (e) Nutrition Service to Preschool Conferences
    - (f) Lecture Courses on Nutrition
    - (g) Dietary Survey of State Institutions
    - (h) Sunshine Camp Study
    - (i) Summer School Courses
    - (j) Natick and Wellesley Nutrition Demonstrations
  5. *Dental Hygiene:*
    - (a) Dental Campaign
    - (b) Dental Advisory Committee
    - (c) Summer School Course
  6. *Health Education:*
    - (a) Pamphlets, Posters, Exhibits, etc.
    - (b) Library
    - (c) Lectures
    - (d) Prenatal and Postnatal Letters and Letter to Fathers
    - (e) Newspaper Publicity
- IV. Special Projects:
  1. May Day — Child Health Day
  2. Franklin County Demonstration
  3. 4-H Clubs
  4. Tidings
  5. The Commonhealth

## I. PERSONNEL OF THE DIVISION

There have been several changes in the staff of the Division during the year. We regret the loss of Miss Mary E. Ayer, Public Health Nursing Consultant for the western district, who died in September, and Miss Catherine A. Bowen, junior clerk, who met death by accident early in November.

Miss Juliet A. Whitteker was appointed Consultant in Public Health Nursing early in the summer, to assist with the work of the western district.

Miss Nancy Jordan was appointed Public Health Nutrition Worker in September, to fill the vacancy caused by the resignation of Mrs. Alice H. Wagenfeld.

The Division staff at present consists of the Director, two Child Welfare Physicians, a Department Consultant in Public Health Nursing, four Public Health Nursing Supervisors, a Public Health Nutrition Supervisor, five Public Health Nutrition Workers, a Public Health Dental Hygiene Supervisor, two Health Education Workers, thirteen stenographers and clerks, and one junior messenger. In addition to the foregoing it was necessary to employ for temporary periods during the year, eleven junior clerks and stenographers, five junior messengers, three conference physicians, because of special work for particular projects such as the May Day — Child Health Day, the Summer Round-Up and the Tercentenary Expositions in Springfield and Boston; for Hyannis Normal School Courses a special instructor was employed.

## II. APPROPRIATIONS FOR THE FISCAL YEAR 1929-1930

### *Division of Hygiene*

	Services	Expenses
Appropriation . . . . .	\$40,000 00	\$20,000 00
Credit by refund . . . . .	—	30 36
		<hr/>
Expended to date . . . . .	39,963 85	\$20,030 36
	<hr/>	18,944 69
	\$36 15	\$1,085 67

### *Maternal and Child Hygiene*

Appropriation . . . . .	\$21,200 00	\$13,500 00
Credit a/c redeemed scrip . . . . .	—	1 87
		<hr/>
Expended to date . . . . .	20,859 76	\$13,501 87
	<hr/>	12,258 38
	\$340 24	\$1,243 49

## III. ACTIVITIES OF THE VARIOUS SECTIONS

### 1. Maternal, Infant and Preschool Hygiene.

#### *(a) Maternity Service.*

The plan of sending out monthly the prenatal letters, letters to prospective fathers, and postnatal letters on the care of the baby during its first two years, still continues to find favor throughout the state. The Division provides a blank on which hospitals, physicians and nursing organizations may record the names of prospective mothers or mothers of infants who desire either of the above services. We find this has been of assistance particularly to the larger hospitals from which we receive monthly lists.

Hospitals in the state providing beds for maternity cases were circularized during the year for information concerning the service they render in the way of prenatal service and data relative to infant and maternal mortality, Caesarean births, stillbirths, breast feeding instruction, and the like. Of the 195 such hospitals circularized with the questionnaire replies were received from 149.

A survey was made to determine in which communities delivery service is given by the local nursing organizations.

#### *(b) Well Child Conferences.*

A survey was made of all established Well Child Conferences in the state. Up-to-date information is on file with regard to 168 such conferences from whom replies were received in response to our questionnaire.

The demonstration Well Child Conferences conducted in Franklin County were continued throughout the year, a detailed report of which appears later. Other demonstration Well Child Conferences were held throughout the state, as usual. The total number of children examined at all conferences during the year was 1,707. Of these 1,316 were in the Franklin County district and 391 in other sections of the state. In Franklin County 31 Well Child Conferences were conducted in 27



communities and 16 such conferences in other parts of the state. Of the 391 children examined outside of Franklin County, 67 or 17% were found to be without physical defects, and 324 or 83% were found to have physical defects. In 324 of the children a total of 531 physical defects was noted. At all the demonstration conferences nutrition service was provided, and a nutritionist was available for other local conferences at some of which a physician was in attendance, and at others where the conference was conducted without the services of a physician.

In the northeastern district two permanent Well Child Conferences were established with a physician in attendance, and two weighing and measuring conferences were established.

In the southeastern district one Well Child Conference was established with a physician in attendance, and three weighing and measuring conferences.

In the Worcester County district one Well Child Conference was established with a physician attending, and one weighing and measuring conference was established.

(c) *Summer Round-Up.*

Owing to a change in program, whereby the reports of correction of physical defects do not come in until after the examinations are completed on the first graders, the number of corrections of defects is not available until later. To date 161 towns have reported having conducted the Summer Round-Up, and complete follow-up reports have been received for 141 of these. In 1929 the complete report showed 185 towns having Summer Round-Up. To date the number of corrections of defects reported was 1,871.

## 2. School Hygiene.

(a) *Legislation.*

Permissive legislation to allow school committees to employ a dental hygienist in the schools again came up before the legislature but was lost.

(b) *Surveys.*

The school hygiene surveys were carried on as usual, eight such surveys being made during the year and one re-check made on a previous survey. Of the 24 communities where surveys were made previous to this year, 22 have accepted the recommendations made and show marked improvement in the service.

(c) *School Hygiene Conferences.*

Three school hygiene conferences were held during the past year. In addition to these regular conferences a special effort was made to reach the school physicians and for this purpose six regional conferences were held. As an outgrowth of these conferences an Advisory Committee of School Physicians is under consideration, six members to be elected by the school physicians and three members to be appointed by the Department of Public Health. This Committee is to work with the school medical section of the Division.

(d) *Salem Normal School.*

We have withdrawn the service we rendered to Salem Normal School through Dr. Moore, and a physician has been appointed by the school to carry on this work.

(e) *Lynn Demonstration.*

We were not called upon to give service to the pupils included in the Lynn High School Study. As an outgrowth of this study they now have a very well-functioning Health Council consisting of teachers in the schools and this is meeting the needs of the pupils remarkably well, considering that the majority of the pupils have not had a physical examination. They are also carrying on an elective course in public health in the senior class. Twenty students are enrolled and this is proving interesting not only to the instructor, the teacher of biology, but also to the pupils themselves. In addition to this a course is provided in the Home Economics section of the school. Besides this, there has been established a health consciousness among all the teachers and pupils in the high schools of the city.

The Chadwick Clinic of the Department X-rayed and examined many of the children and of the 65 children found to be positive by X-ray last year, all had a personal home visit by one of the nutritionists of the staff of the Division of Child Hygiene.

(f) *Hyannis Normal School Courses.*

The usual courses were held at Hyannis Normal School during the summer.

The necessity for continuing some of these courses is now under consideration and the probability is that we will continue some only long enough to finish the courses for certification.

(g) *Fitchburg Normal School Courses.*

Courses were conducted as usual at Fitchburg Normal School for teachers in Day Vocational Schools and Evening Practical Arts Schools. These were carried on by two nutritionists of the Division. A new procedure was followed this year by which a nutrition clinic was held which added to the interest of the teachers.

(h) *Handbook on School Hygiene.*

Considerable time was spent in completing the manuscript of the Handbook on School Hygiene, which is now in the printer's hands and is expected for distribution early in the coming year.

(i) *Advisory Committee on High School Activities.*

In connection with May Day — Child Health Day an Advisory Committee on Health Day Activities in the High School was formed and an interesting program was drawn up including a Students' Health Council and health activities by the students.

### 3. Public Health Nursing.

The Director feels that the Consultant Nurses have given increased service to the communities owing to the fact of having more field days. The Nurses' Clubs are increasing in number and we find this a very valuable piece of organization work.

The number of courses in public health, given to nurse training schools, has also increased.

Nutrition courses have been given to public health nurses with very good attendance on the part of the nurses, averaging about sixty to each course.

There has been an increased effort on the part of the Consultant Nurses to have the local nurses establish a record system in communities where none were kept and this has been accomplished in a number of such communities.

More effort is being made to contact industrial nurses and to include them in the community health program.

(a) *Advisory Committee on Public Health Nursing and Social Service.*

The assistance given by the Advisory Committee on Public Health Nursing and Social Service has been very valuable during the past year. Three meetings were held for the discussion of policies concerning public health nursing.

(b) *The Department Consultant in Public Health Nursing* has given valuable assistance to the Division Directors in matters of public health nursing and social service. She has made a survey of the situation and has made definite recommendations. She is acting as group leader for an Extension Course for Nurses given by the New York Department of Health to the nurses of this state. She also gave two courses at Hyannis Normal School during the summer.

(c) *Postgraduate Work for Department Consultants.*

Through the generosity of the Rockefeller Foundation, one of the Public Health Nursing Consultants of the Division was permitted to take a "refresher" course at East Harlem Nursing and Health Center, New York City. This has proved of great value to her and of greater value to the nurses in the field. It has stimulated other members of the nursing staff and it is to be hoped that all can be sent for this type of postgraduate work.

(d) *Change in Personnel.*

Miss Juliet A. Whitteker was appointed Public Health Nursing Consultant for the western district, to assist Miss Ayer and relieve her of some of the burden of a heavy district, and has since taken her place. She has been able to carry on the program started by Miss Ayer and is getting acquainted with her communities very rapidly.

### 4. Nutrition.

(a) *Chadwick Clinics.*

The nutritionists of the Division were in attendance upon 76 of the primary Chadwick Clinics. The three nutritionists regularly in attendance upon these clinics made a total of 1,386 home visits and interviewed 769 children at the time they were examined at the clinics.

*(b) Follow-Up Clinic.*

Two nutritionists carried on the work of the Follow-up Clinics. In the examination of 2,821 children in 132 towns of the State, one nutritionist interviewed 1,052 parents. In this group of children 21.9% were found to be malnourished. The second nutritionist, in her work in 196 towns interviewed 4,314 old cases and 164 new cases, and interviewed 1,630 parents. In this group 24% were found to be malnourished children.

*(c) Summer Camps.*

During the early summer, visitation of the summer camps was begun. Thirteen such camps were visited and recommendations made for change in meal planning where necessary.

*(d) School Lunch.*

Consultations were held with local directors of school lunches to the number of 98. These were of value in planning balanced lunches for school children and in aiding them to select proper lunches.

*(e) Nutrition Service to Preschool Conferences.*

A nutritionist was in attendance upon 110 preschool conferences at which she interviewed 1,069 parents of children regarding proper feeding and dietary problems.

*(f) Lecture Courses on Nutrition.*

Lecture courses on nutritional subjects were given in three towns to groups of teachers, a series of two lectures in each course.

In five towns a course of six lectures was given to groups of nurses, and in this group of lectures 1,088 were reached.

There were 77 talks given during the year by the nutrition staff of the Division, reaching a total of 3,639 persons.

*(g) Dietary Survey of State Institutions.*

This service was offered to the State Institutions of the Department and proved to be of benefit in meal planning for proper nutrition. Consultation service was offered for Norfolk Prison Colony, an institution under the supervision of the State Department of Correction.

*(h) Sunshine Camp Study.*

This year saw the completion of the study of Sunshine Camp at Cambridge, a piece of work in cooperation with the Cambridge Tuberculosis Association.

*(i) Summer School Courses.*

The usual summer courses in nutrition were given, for nurses and teachers. The course at Hyannis State Normal School was given by the Consultant in Nutrition and those at Fitchburg State Normal School by two of the nutrition workers of the Division.

*(j) Natick and Wellesley Nutrition Demonstrations.*

These demonstrations have been carried on for another year. The work in Natick is based on the "fair" and "poor" nutrition notations made by the school medical service, and consisted of home visits, follow-up work, hot lunches, and an instruction period. In Wellesley the work resolved itself into a health education program, with a small amount of home visiting, the health education work being carried on from the kindergarten through the sixth grade.

## 5. Dental Hygiene.

*(a) Dental Campaign.*

For the purpose of carrying on the dental campaign, 310 towns cooperated in using the dental material prepared by the Department. Complete reports were received from 178 towns which included a total of 265,268 children enlisted in the dental campaigns. The number of children receiving dental certificates from the family dentist was 44,774 and the number receiving certificates from clinics was 45,989.

The number of towns reporting dental campaigns increased . . . 41%

The number of children included increased . . . 65%

The number of children having dental work completed by the family dentist and at dental clinics increased . . . 80%

There are 260 dentists, 51 dental hygienists, and 52 dental assistants working in the schools throughout the state.

In the dental campaign, towns reported dental corrections from 5% to 50%.



There were distributed 342,280 pieces of printed matter and educational leaflets were distributed to the number of 295,000.

Consultant service from the Department was requested by 43 communities.

(b) *Dental Advisory Committee.*

As in previous years, the Dental Advisory Committee gave valuable assistance and passed upon policies with regard to preschool dental work, dental work in the Summer Round-Up Campaign, and a record form for use in Well Child Conferences, as well as a new Notification of Dental Defects card. In communities where there is no school dentist the Dental Advisory Committee recommends a dentist in town assuming sponsorship for the dental hygienist.

(c) *Summer School Course.*

The summer school course for dental hygienists was held at Hyannis State Normal School as usual, with an enrollment of 10 students.

## 6. Health Education.

(a) *Pamphlets, Posters, Exhibits, etc.*

The printing of pamphlets during the year totalled to 2,168,610 pieces. In addition to these there were printed 22,000 copies of the quarterly bulletin of the Department, *The Commonhealth*.

Since the physicians of the state were circularized with regard to pamphlets on venereal diseases there has been an increase of about three times the usual amount of material sent out on those particular subjects.

From the Eastern States Exposition at Springfield in the fall we received 683 requests for supplies of our pamphlets, and from the Boston Exposition of State Activities at the Commonwealth Armory later we received 3,705 orders for such pamphlets. These orders alone totalled to 132,448 pieces of printed matter to be handled in order to fill these requests, which of course, increased the need for employing extra assistance for a period of about thirty days.

To fill requests for Child Health Day material 608,666 pieces of printed matter were sent out; the Summer Round-Up orders added to this 168,290 pieces of material; and all other usual orders totalled to 599,906, making the sum total of all printed matter sent out during the year 1,706,625 pieces. Included in this total were 421,263 pieces of printed matter to fill requests received from teachers cooperating in the campaign of education through correlation with art work in the schools. In connection with this campaign 1,515 sheets of health slogans were distributed for use in health poster making in the schools.

The Health Education Worker, through whom this campaign is conducted, executed 191 pieces of chart or poster work during the year for the various divisions of the Department.

All states in the Union but eight have requested samples of our printed matter, the number of requests totalling 436, and 19 foreign countries have availed themselves of this privilege.

Special effort has been made to bring the exhibit material up to date and to secure posters in keeping with modern ideas. For this latter purpose the artist of the Division made a series of posters, one group for use with first graders, a series of five on health habits, which are accompanied by stories for the teacher's use; another set of posters was prepared on health education, for use in junior high schools. Both series were planographed from the original drawings and reproduced in quantity for state-wide distribution.

(b) *Library.*

To carry on the work of maintaining a reference library for the use of the Department staff there were purchased during the year 208 books and pamphlets; 84 subscriptions to medical journals and memberships in health organizations were renewed; 11 new subscriptions were added to the list; 24 new books were added for the use of teachers and students at the Hyannis Normal School summer courses; 4 issues of the quarterly bulletin, *The Commonhealth*, were printed. The total expense for library purposes amounted to more than \$5,500 for the year.

(c) *Lectures, Motion Pictures, etc.*

During the year 761 lectures and 45 radio talks were given by the Department staff, reaching approximately 42,481 persons exclusive of the radio listeners. Motion pictures were loaned to 53 towns, and 57 communities in the state requested

the use of our delineascope film strips; posters were loaned for use in 63 towns and in 19 towns the Department exhibits were displayed.

(d) *Prenatal and Postnatal Letters and Letter to Fathers.*

We average about 500 new requests for prenatal service monthly and approximately 500 new requests for postnatal letters monthly, so that with the names already on the registry (about 1,500 prospective mothers and 11,000 mothers on postnatal registry covering the baby's first two years) a total of about 12,500 persons is reached with this service each month.

Recently we have been enclosing with the Father's Letter two leaflets sent out by the venereal disease section of the Department, "The Least Privileged Child" and "The Great Imitator." These are sent to all families from which new requests for prenatal letters are received.

(e) *Newspaper Publicity.*

We have received excellent support from the newspapers in all matters of publicity for meetings, special projects, and the like, and the papers have accepted formal articles on particular subjects.

#### IV. SPECIAL PROJECTS

##### 1. May Day — Child Health Day.

In connection with May Day — Child Health Day, two demonstrations were held in different sections of the state to demonstrate May Day activities in the way of a pageant for the older children, and pantomime for the younger children.

Twenty-four talks were given in relation to these activities. From communities planning to have Child Health Day celebrations 304 orders were received for material, and reports were received during the year from 207 towns of the plans as they were carried out. Publicity with regard to this activity was carried by 96 newspapers, and 160 newspaper clippings were received regarding it.

The reward tags this year were changed from those used in former years. A "Physically Fit" tag was awarded to those children who were found to have no physical defects upon examination by the physician. An "Improvement" tag was awarded to those children who had defects corrected before Child Health Day, and a "Teeth" tag was awarded to those children having dental defects corrected as far as possible before Child Health Day.

A pageant similar to the one demonstrated by the Department was put on in 66 towns, and 51 towns used the pantomime for the younger children. The Child Health Day poster was displayed in 103 towns and 50 communities had window displays.

##### 2. Franklin County Demonstration.

The report of this demonstration covers about three and one-half years, during which time 4,793 examinations of children were made for 3,059 children. In the third year there were 35% corrections of defects; in the fourth year to date there were 46% corrections of defects reported. On the third complete examination there were found without defects 531 children, or 38%; with defects 822 children, or 62%. In 822 children there were found 1,122 defects.

In 1930 the total number of children examined was 1,707 in all the conferences held by the Department. In Franklin County alone there were 1,316 children examined.

##### 3. 4-H Clubs

Special effort was made this year to give service to the 4-H Clubs. This has been given through talks and demonstrations given by the Health Education Worker, and by having our Child Welfare Physician examine the children competing for prizes for good health.

##### 4. Tidings.

We have revived "Tidings" and have made it a bulletin to be devoted to public health in general rather than school hygiene alone, as formerly. It was planned primarily for public health nurses doing school work but is being sent now to other health workers in the field.

### 5. The Commonwealth.

Special numbers of The Commonwealth during the past year were devoted to Adult Hygiene, Child Hygiene, Diphtheria and The Deaf and Hard of Hearing. It was necessary to secure 5,000 extra copies of the Adult Hygiene Number for the use of the Division of Adult Hygiene, with reprints of special articles appearing in in that number; 1,500 copies additional of the Child Hygiene Number, and 500 additional copies of the Deaf and Hard of Hearing were ordered, as well as special reprints.

There were added to the mailing list for The Commonwealth more than 500 new names and 200 copies of each issue during the year were sent outside the state upon request.



## REPORT OF DIVISION OF COMMUNICABLE DISEASES

CLARENCE L. SCAMMAN, M.D., *Director*GAYLORD W. ANDERSON, M.D., *Assistant Director*

## GENERAL STATEMENT

During 1930 there were reported 101,179 cases of communicable diseases, an increase of 17 per cent over the 1929 total. This increase was accounted for almost entirely by the increase in incidence of measles during 1930.

A brief summary of pertinent information is given herewith for certain diseases: *Anterior Poliomyelitis* (Table I). — This disease was reported 503 times and its incidence was the highest for any year since 1916, with the exceptions of 1920 and 1927.

Besides its localization in the Metropolitan Area, its prevalence was marked in the northeastern section of the State, especially on the North Shore. Less than 20 per cent of the total cases occurred in the counties of Bristol, Middlesex, Norfolk, Plymouth, and Worcester. But 10 cases were reported in all that portion of the State west of Worcester.

In cooperation with the Harvard Infantile Paralysis Commission, the Department continued to furnish special consultative service to physicians in this disease. Such service was furnished in 216 instances, in 139 of which a diagnosis of poliomyelitis was made, and convalescent human serum was given in 79 cases.

*Diphtheria* (Table II). — There were 3,322 cases of diphtheria and 182 deaths reported during 1930, giving a case rate of 78.1, a death rate of 4.3 and a fatality rate of 5.5. The reported incidence this year is the lowest on record.

In the presence of this low record of statewide incidence, several large communities have had a notably high incidence of the disease, especially Cambridge, New Bedford, Salem, Somerville, and Springfield. A few communities, especially Lawrence and Milford, have for the first time conducted active diphtheria immunization programs, and several dozen communities are continuing reasonably well such programs begun some years before.

During the year one number of the Department's publication, "The Commonwealth," was devoted to diphtheria. Reprints of the following articles contained therein are available for distribution to physicians and boards of health:

The Results of Community Immunization Against Diphtheria.

A Diphtheria Immunization Campaign — Organization and Methods.

The Prevention of Diphtheria — Methods of Prevention.

The Communicable Disease Nurse in Diphtheria Control.

The Laboratory Diagnosis of Diphtheria and Release of Carriers.

The Treatment of Diphtheria.

In addition to the purchase and distribution of fifty billboard posters illustrating the advantages of diphtheria immunization to communities where diphtheria immunization programs are under way or anticipated, the Division has diphtheria case history cards as well as diphtheria immunization record cards which will be furnished without cost to any board of health, on request.

*Epidemic Cerebrospinal Meningitis* (Table III). — The anticipated increase in the incidence of this disease did not materialize. One hundred and seventy-four cases were reported this year as against 167 for 1929, an increase of about 4 per cent. Although the incidence of the disease was high the first half of the year, it was distinctly lower than for 1929 in the last half of the year.

The diagnostic service offered for this disease was called in consultation 38 times. Of this number 11 were diagnosed as having this disease. This service was not only appreciated by the public, but by the medical profession as well.

*Influenza*. — Influenza was abnormally low, only 258 cases being reported as against 10,166 for the previous year. The 1930 incidence of this disease was the lowest since the disease was made reportable in 1918.

*Malaria*. — Forty-two cases of malaria were reported this year as against 27 for 1929. Of these, 5 were "therapeutic," 3 were apparently contracted within the State, and 34 received their infection outside the borders of Massachusetts. Elsewhere in the report a short statement appears on "Malaria Prevention" by our Consulting Epidemiologist, Dr. W. G. Smillie.

*Measles* (Table V). — During 1930 there were 27,137 cases of measles reported as compared with but 14,925 in 1929. The majority of the cases occurred in and around the Metropolitan Area and did not appear until late in the winter and spring. The early months of the coming year will likely see a high incidence of measles in other sections of the State. In view of this fact, the Division plans to recircularize the physicians in the State in regard to the effectiveness of parental blood in modifying measles among children under the age of three or four, or in those at any age who are debilitated, for whatever reason. This effort, obviously, is directed toward the prevention of measles deaths and not toward the control of the incidence of the disease.

*Rabies*. — Dog bites, whether or not requiring antirabic treatment, were reported 5,189 times this year as against 4,635 in 1929, an increase of about 12 per cent.

Rabies among dogs continues to be epidemic in the State, for 292 positive heads were reported from our laboratory this year as against 316 for 1929. The special localization of these positive heads was Pittsfield, Springfield, and Worcester. One human being is known to have died of rabies during the year.

*Scarlet Fever* (Table VI). — This year 9,408 cases of scarlet fever were reported, giving a case rate of 221.1, a mortality rate of 2.3 and a fatality rate of 1.0.

*Septic Sore Throat*. — This disease was reported 422 times as against 271 for 1929. This is a 56 per cent increase over 1929 and is in large part accounted for by the Ayer and Wilbraham outbreaks of 178 and 17 cases, respectively. There were no deaths in these two outbreaks. It is of interest to note that the outbreak in Ayer caused the local board of health to pass a regulation requiring that all milk sold in the community be pasteurized or certified.

*Smallpox* (Table VII). — Two cases of this disease were reported this year, one in Palmer and the other in Agawam. Neither one of these cases had been vaccinated, although one of them had been admitted to school on the basis of an exemption certificate.

*Typhoid Fever\** (Table X). — This disease was reported 318 times this year as against 307 for 1929, or an increase of 4 per cent. There were 38 deaths.

For the second consecutive year in forty-four, namely, since 1886, we have gone thru the year without a milk-borne outbreak of typhoid fever.

Of the 318 reported cases, the source of infection was discovered in 100, or in 30 per cent of the cases. Of these cases, 23 per cent were traced to polluted water, 9 per cent to food infected by a carrier, 44 per cent to food infected by an unknown source, 7 per cent to contact with carriers, and 17 per cent to contact with known cases.

Of the 318 cases reported 201 were known to have been hospitalized.

The following table shows the per cent of persons for the years 1928, 1929, and 1930 who had at least two negative release cultures following their convalescence from typhoid fever:

YEAR	Reported Cases	Deaths	Living Cases	No. Having Release Cultures	Per Cent Release Cultures
1928 . . .	310	36	274	178	65
1929 . . .	307	42	265	191	72
1930 . . .	318	38	280	236	84

*Undulant Fever*. — This disease, declared reportable January 1, 1930, was reported 6 times during the year.

*Whooping Cough* (Table XI). — This disease was reported 10,750 times this year as against 7,708 the previous year, an increase of about 39 per cent.

*Psittacosis*. — During the early part of the year numerous cases of suspected psittacosis (parrot fever) were brought to the attention of the Division. Of the cases investigated, 15 were found in which a reasonable diagnosis of psittacosis could be entertained. Only one of these was fatal. The cases occurred in Adams, Boston, Brookline, Everett, Lexington, and Newton. A study of these cases will be printed in the January 8, 1931, issue of the New England Journal of Medicine.

*Jamaica Ginger Paralysis*. — During late March and April the Division was asked to investigate cases of partial paralysis which occurred in individuals, apparently following the drinking of Jamaica Ginger obtained from illicit sources. Of

\* This includes 2 cases of Paratyphoid Fever B. Both Paratyphoid Fever A and B were made reportable March 15, 1930.



the 40 or more cases investigated, one or more of them occurred in Boston, Chelmsford, Chelsea, Lowell, Lynn, Newburyport, Peabody, Westford, and Worcester. There were without doubt many more cases, possibly several hundred, which occurred in the State, but only a small fraction were ever called to our attention. The paralysis affected primarily the legs and hands, and in many cases has left considerable disability.

#### OUTBREAKS

*January-April.* — Diphtheria; Wrentham State School. Twenty-eight cases reported; fourteen of which were among employees. All of cases among children extremely mild, due to previous immunization.

*January.* — Typhoid fever; Somerville. Confined to one family. Source of infection of the first two cases unknown. These cases not reported until death of one. Other cases contact infections. Seven cases; one death.

*December, 1929-March.* — Typhoid fever; Lawrence. All cases occurred among employees in an industrial plant. Drinking water at the plant was polluted through faulty cross-connection. Ten cases; no deaths.

*March.* — Streptococcus sore throat; Ayer. Explosive outbreak lasting about a week. Vehicle of infection — raw milk. Source of infection — one or more of the workers in the dairy, who directly infected the milk. Hemolytic streptococci were obtained from the throats of two of the milkers and several patients. One hundred seventy-eight cases; no deaths.

*April.* — Streptococcus sore throat; Wilbraham. Traced to a raw milk supply. Throat cultures from a helper on the dairy farm showed hemolytic streptococci. Seventeen cases; no deaths.

*March, April, May.* — Diphtheria; Reading. All cases appeared in a boarding home for children. It was felt that one of the two women running the home was probably a carrier. Both of these women refused to submit to throat cultures. Fifteen cases; no deaths.

*May.* — Gastro-enteritis; Lee. Occurred twenty-four hours after a banquet held at a local inn. Cultures from several of the cases as well as the inn house-keeper were negative. Analysis of food revealed no pathogenic organism. Twenty-five cases; no deaths.

*May.* — Gastro-enteritis; Blandford. Eleven out of a group of thirty workmen taken violently ill within a few hours of each other. Staphylococci were found in the ham eaten at lunch but without pathogenicity. Eleven cases; no deaths.

*May, June.* — Typhoid fever; Norwood. Cases occurred among boys of about the same age. All but two, who were contact cases, gave a history of wading in a badly polluted brook. Sewage overflowed directly into the brook after heavy rain-storms. Seven cases; no deaths.

*May, June, July.* — Diphtheria; Northampton State Hospital. The first case occurred in an attendant on the female side. All other cases occurred among the women patients apparently spread by contact. Thirty-five cases. (Six deaths — secondary cause.)

*June.* — Bacillary dysentery; Westport. Cases occurred in one family, mother and three children. Source of infection of the first case not determined. Other cases presumably secondary to the original one. Autopsy material showed presence of dysentery bacillus of "Y" type. Four cases; two deaths.

*July.* — Gastro-enteritis; Pondville Hospital. Occurred with one exception among employees; vehicle apparently chicken salad. Forty cases; no deaths.

*July.* — Diphtheria; Middleton. Two cases in same dormitory at children's rest camp within three days of each other. One carrier found, who presumably infected the first case. Two cases; no deaths.

*August.* — Bacillary dysentery; Worcester. Three cases reported in children with one death. Stool specimens positive for bacillary dysentery. Nine other people in same dwelling suffered attacks of diarrhea but stool examinations negative for bacillary dysentery. Three cases; one death.

*August.* — Typhoid fever; Framingham and neighboring communities. Following a picnic fifty cases of typhoid fever developed. Vehicle of infection probably food. Source of infection undetermined. Fifty cases; four deaths. (45 cases officially reported.)

*August.* — Typhoid fever; Chatham. A guest and three employees of a summer



hotel on the Cape developed typhoid fever. Source of infection not determined. Four cases; no deaths.

*September.* — Gastro-enteritis; Hopkinton. Ten of fifteen people attending a picnic became ill. All of those who were taken ill drank from a badly polluted brook. Ten cases; no deaths.

*September, October.* — Typhoid fever; Lawrence. After a picnic held at a park in Methuen, attended by between three and four thousand children, seven developed typhoid fever. All gave a history of having drunk from a faucet carrying water pumped directly from the Merrimack River, and intended merely for washing purposes. Seven cases; no deaths.

*September.* — Gastro-enteritis; Worcester. Following a wedding dinner, some twenty-five of the one hundred and fifty guests became ill. Lobster salad suspected. Specimens from two persons who had prepared the salad were negative. Twenty-five cases; no deaths.

*September.* — Anterior poliomyelitis; Brewster. Three cases developed among boys who had attended a summer camp. All cases developed after the camp closed for the season. Three cases; one death.

*September.* — Dysentery; Andover. Numerous cases of gastro-intestinal disturbances developed in private academies and town. Sonne dysentery suspected. Source of infection and mode of spread not determined.

*November.* — Gastro-enteritis; Norfolk State Prison Colony. About one hundred cases developed in the colony among the staff, employees and prisoners. The same food was not served to the different groups, but was prepared by the same person.

*November.* — Diphtheria; Peabody. Five cases of diphtheria occurred among girls employed in a textile mill. The first case occurred in August. All of these cases were in one Department, and apparently resulted from contact with a carrier. Five cases; one death.

*November, December.* — Typhoid fever; Boston. Eleven cases of typhoid fever occurred in connection with a women's college, ten among the students and one in an employee. A carrier was discovered among the kitchen help. Eleven cases; no deaths.

*December.* — Typhoid fever; Windsor. Apparently following church supper. Source of infection undetermined. Five cases; no deaths.

*December.* — Typhoid fever; Provincetown. Source undetermined. Four cases; one death.

*December.* — Gastro-enteritis; Boston. Over 100 persons ill after banquet in a hotel. Source of infection not determined. No deaths.

### Sub-Division of Gonorrhea and Syphilis

The regulations for the reporting of gonorrhea and syphilis, which took effect on January 1, 1930, and which required that all forms and stages of gonorrhea and syphilis be reported directly to the State Department of Public Health, have most satisfactorily justified themselves. An increase of 58.2 per cent in the reporting of gonorrhea and of 174 per cent in the reporting of syphilis, or an increase of 88.2 per cent in the reporting of the two diseases together, is noted (Table XII).

There were 149 deaths from syphilis with a death rate per 100,000 population of 3.5 and a fatality rate of 3.6. If the deaths from general paralysis and tabes dorsalis are included, which they should be, deaths from syphilis total 359 with a rate of 8.4 per 100,000 population (Table XIII).

It is interesting to note that of the 98 communities not having cases this year, ninety-seven (99 per cent) were under 5,000 population and sixty (61.2 per cent) were under 1,000 population. In 1929, forty-three (16.7 per cent) of the 258 communities without cases were over 5,000 population. Reports were received from 1,081 physicians, 18.6 per cent of the 5,829 practicing physicians in the State. Gonorrhea was reported by 15.2 per cent; syphilis was reported by 8.1 per cent. If, as indicated by various studies made at various times over the country, 60 per cent of the physicians treat either gonorrhea or syphilis or both, reports might have been expected from 3,500 of the 5,800 physicians. Then the 1,801 physicians reporting represent 31 per cent of those who might be expected to report.

There are still fifty-two treatment centers in the State, no new clinics having

been added nor any old ones closed. Fourteen of these clinics were subsidized by this Department. During the year these fourteen clinics admitted 2,498 cases of gonorrhea and 2,462 of syphilis — a total of 4,960 as compared to 4,401 in 1929. These patients made 190,535 visits as compared to 172,777 made last year (Table XIV). How to provide adequate treatment for those who are unable to pay a physician and who live in areas far removed from clinic service is a problem which to date has not been solved. It is perhaps one of the most pressing of our problems and is rapidly becoming more so as more boards of health signify their willingness to provide treatment for those who apply.

The experiment in social work at the Lowell Clinic was continued throughout the year with aid from the Massachusetts Society for Social Hygiene. The Society has decided to discontinue its support at the end of the year since the Lowell Board of Health has agreed to carry the salary of the social worker in its own budget.

The Department social worker continued as usual to investigate special cases and to contact the clinics. Local boards of health over the State are assuming more of the responsibility for follow-up of cases than ever before. This year, 2,476 cases, which had been reported to this Department as lapsing treatment or as sources of infection, were referred to boards of health of 131 communities for investigation. One hundred and nine communities (83.2 per cent) have reported on 2,238 (90.4 per cent) of the cases; 238 cases are still pending, most of which were referred in December and will be heard from in the early part of 1931. Twenty-two cities and towns have failed to report back on any of the 28 cases referred to them. In the State as a whole 48 per cent of the cases were found and closed. In Boston, with its large transitory population 35.6 per cent of the cases only could be found, while in the balance of the State 65.8 of the cases were found.

On the first of April, Dr. Henry M. DeWolfe came to the Sub-Division as Epidemiologist. It was planned to have him spend most of his time visiting physicians all over the State, with the following objects in view: —

1. To learn who are the physicians in the State who treat gonorrhea or syphilis as specialties, frequently but not as specialties, rarely, and not at all.
2. Knowing who the physicians are who treat, to organize local services for the instruction and information of the less informed through the services of the better informed.
3. To attempt to bring to the physician a consciousness that the problem of controlling gonorrhea and syphilis is a large and serious one and that the responsibility of the physician does not end with the simple treatment of the patient, but has widespread social ramifications which have an important bearing on the public health.

By the end of the year Dr. DeWolfe had visited 349 physicians in Barnstable and Plymouth Counties and in the State west of Springfield. He found that 55.8 per cent of the physicians treat gonorrhea — 84 per cent of these occasionally, 15 per cent frequently and 1 per cent as a specialty. He found that 47.2 per cent of the 349 physicians treat syphilis — 85.4 per cent of these occasionally, 13.4 per cent frequently and 1.2 per cent as a specialty. He found that 61.5 per cent of the 349 physicians treat either gonorrhea or syphilis and that 38.5 per cent treat neither disease.

The total distribution of arsenicals increased only slightly from 44,533 grams in 1929 to 45,001 grams in 1930. All of the increase was in that distributed to practicing physicians, which increased from 7,640 grams in 1929 to 8,898 grams in 1930. Three hundred and nineteen physicians ordered arsenicals this year, bringing the total physicians using State arsenicals since it was offered to them in 1928, to 514 (Tables XV, XVI).

The Wassermann Laboratory reports a total of 85,707 bloods examined, of which 74,672 were negative; 6,772 positive; 2,446 doubtful; and 1,817 unsatisfactory. There were 4,154 spinal fluid examinations made, of which 2,976 were negative; 858 positive; 121 doubtful; and 199 unsatisfactory. The Bacteriological Laboratory reports 7,321 smears examined for gonorrhea, of which 1,472 (20.2 per cent) were positive and 5,849 (79.8 per cent) negative. Smears to be examined for gonorrhea constituted 20.7 per cent of the total specimens for all purposes examined by the laboratory during the year.

The 2,000 druggists in the State have twice been circularized with informative



material to discourage their treatment of gonorrhea and syphilis and offering literature for distribution to those who seek their advice. One result of these contacts with the druggists has been that 420 of them (21 per cent) have volunteered to distribute 20,000 pieces of literature to those who come to them seeking advice.

During the year nearly 150 lectures were given by members of the personnel of this Sub-Division to about 12,000 persons. All types of professional and non-professional groups were reached such as physicians, medical students, nurses, social workers, high school and college students, as well as club groups and special public meetings. Dr. Helen I. D. McGillicuddy, part-time lecturer with the Department and Educational Secretary of the Massachusetts Society for Social Hygiene, has been useful this year, as in past years, in talking to women and girls. It is of interest to note that among the lectures given by Dr. McGillicuddy, 17 were in 9 different public schools.

During the year 106,000 pieces of literature were distributed by this Sub-Division, of which 16,000 were of a technical nature for physicians, 65,000 especially for patients, and 25,000 for general popular or semi-professional groups. Following is a list of the publications prepared or purchased by the Department for distribution:—

1. Information for Men with Gonorrhea.
2. The Great Imitator — Reprinted by courtesy of the Metropolitan Life Insurance Company.
3. What is to be done about Gonorrhea and Syphilis?
4. Interstitial Keratitis — Skirball, Commonwealth, Vol. 17, No. 1, 1930.

Purchased for distribution:

1. Syphilis and the Wassermann Reaction in the Private Practice of Obstetrics — Moore, Bulletin of V.D. Information, U.S.P.H.S., 1930.
2. Editorial, The Least Privileged Child — Am. Social Hygiene Ass'n.

There are also under preparation for distribution "Minimum Standards for the Diagnosis, Treatment and Control of Gonorrhea" and "Information for Women with Gonorrhea."

#### LOCAL REGULATIONS

During the year a joint committee of the Department and the Massachusetts Association of Boards of Health drew up rules and regulations for boards of health in communities with a population under 20,000.

#### MILK REGULATIONS

During 1930 regulations requiring that all milk be either pasteurized or from tuberculosis-free cows were adopted by twenty-two additional communities. Of the three hundred and fifty-five cities and towns in the State, ninety-nine are so protected. This means that 78 per cent of the population in the State has this protection as contrasted with only 67 per cent at the end of 1929.

#### DISTRICT HEALTH UNITS

Under a cooperative arrangement with the Commonwealth Fund of New York City, the Department has been engaged in organizing two separate District Health Units, one of fifteen towns in the Southern Berkshire Area and the other of fourteen towns in Northeastern Worcester County (The Nashoba Valley). Each of these units represents an area of approximately 400 square miles and a population of about 20,000. As the year draws to a close, we have been able to interest each of the boards of health in the two areas in the importance of centralizing their health activities under the direction of a full-time medical health officer and a competently trained staff. The Commonwealth Fund of New York City will not only give direct financial aid to the two areas, in addition to the total appropriation by the separate communities, but will furnish trained personnel in the medical and nursing fields to assist the local health officer and his staff to final successful accomplishment.

#### SUMMER CAMPS

During the summer, through the services of a full-time inspector, about 175 camps were visited throughout the State. Special visits were subsequently made by the Engineering Division to those in which there was some question as to the suitability of the water supply. Personal letters were sent to all camp directors and recommendations were made for improvement both as to the medical super-



vision and as to the sanitary conditions. The general sanitary and medical status of the camps was distinctly improved over that found at the time of the previous inspection in 1926.

#### DISTRICT HEALTH OFFICERS

During the first four months of the year the Berkshire District was lacking a District Health Officer and was covered by Dr. Miner of the Connecticut Valley District. On May 1st, Dr. F. S. Leeder became District Health Officer of the Berkshire District. On May 15th Dr. Knowlton was made District Health Officer at large in connection with the organization of union health districts and was succeeded in the Northeastern District by Dr. Robert E. Archibald.

The usual inspections of jails and lock-ups, dispensaries, clinics and communicable disease hospitals were carried on by the District Health Officers as well as the many specific problems which arose in their respective districts.

This year five surveys were made by the District Health Officers with the assistance of the central office staff.

The District Health Officers were called into consultation 218 times by the physicians in their respective districts.

Approximately 15,000 people were reached through lectures by the personnel of the Division.

#### BACTERIOLOGICAL LABORATORY

During the year ending December 31, 1930, the Bacteriological Laboratory examined 35,575 specimens (Table XVII). This was a slight increase over the number examined in 1929. The greatest increases were in the number of examinations of blood, feces and urine for typhoid bacilli and of blood for the agglutination test for undulant fever.

Nine outbreaks of suspected food poisoning were investigated. Samples of the suspected food and blood and stool specimens from several of the patients were examined. Although many bacteria were isolated and studied for their cultural characters and pathogenicity for laboratory animals, no bacterium that could be considered the etiologic agent was found in any instance. No bacillus of the salmonella group was found.

Among the unusual tests were examinations of sick and dead parrots for *Bacillus psittacosis*. The results were negative.

On account of the occurrence in Massachusetts of a few cases of bacillary dysentery caused by the Sonne strain, search has been made for this organism. It has not been found, although the blood of two persons who had recovered from some intestinal disorder gave a positive agglutination test for the Sonne strain of bacillus.

Two hundred eighty specimens of blood were examined for the agglutination test for undulant fever. Thirteen showed agglutination in dilutions as high as 1/135.

The total number of examinations were 35,575 as follows: diphtheria, 16,369; tuberculosis, 4,010; typhoid fever, 5,090 (Widal test, 2,019; blood, feces and urine for typhoid bacilli, 3,071); gonorrhea, 7,321; pneumonia, 468; malaria, 58; miscellaneous, 2,259.

\*TABLE I. — *Anterior Poliomyelitis*

YEAR	Cases	Case Rate per 100,000	Deaths	Death Rate per 100,000	Fatality Rate (Per Cent)
1926 . . . . .	245	5.8	44	1.0	18.0
1927 . . . . .	1,189	27.8	169	4.0	14.2
1928 . . . . .	434	10.0	65	1.5	15.0
1929 . . . . .	119	2.7	21	.5	17.6
1930 . . . . .	503	11.8	35	.8	7.0

TABLE II. — *Diphtheria*

YEAR	Cases	Case Rate per 100,000	Deaths	Death Rate per 100,000	Fatality Rate (Per Cent)
1926 . . . . .	3,401	80.7	249	5.9	7.3
1927 . . . . .	4,750	111.3	268	6.3	5.6
1928 . . . . .	4,052	93.7	249	5.8	6.1
1929 . . . . .	4,255	97.1	256	5.8	6.0
1930 . . . . .	3,322	78.1	182	4.3	5.5

\*Rates based on population estimated as of July 1. 1926-1929 population estimated from 1920 and 1925 census. 1930 estimated from 1925 and 1930 census.

TABLE III. — *Epidemic Cerebrospinal Meningitis*

YEAR	Cases	Case Rate per 100,000	Deaths	Death Rate per 100,000	Fatality Rate (Per Cent)
1926 . . . . .	116	2.8	39	.9	33.6
1927 . . . . .	75	1.8	43	1.0	57.3
1928 . . . . .	107	2.5	38	.9	35.5
1929 . . . . .	167	3.8	79	1.8	47.3
1930 . . . . .	174	4.1	59	1.4	33.9

TABLE IV. — *Lobar Pneumonia*

YEAR	Cases	Case Rate per 100,000	Deaths	Death Rate per 100,000	Fatality Rate (Per Cent)
1926 . . . . .	5,134	121.8	2,409	57.2	46.9
1927 . . . . .	4,279	100.2	1,969	46.1	46.0
1928 . . . . .	4,785	110.6	2,163	50.0	45.2
1929 . . . . .	5,287	120.7	2,202	50.3	41.6
1930 . . . . .	4,333	101.8	1,883	44.3	43.5

TABLE V. — *Measles*

YEAR	Cases	Case Rate per 100,000	Deaths	Death Rate per 100,000	Fatality Rate (Per Cent)
1926 . . . . .	30,020	712.4	367	8.7	1.2
1927 . . . . .	13,498	316.2	87	2.0	.6
1928 . . . . .	41,519	960.0	265	6.1	.6
1929 . . . . .	14,925	340.7	121	2.8	.8
1930 . . . . .	27,137	637.8	137	3.2	.5

TABLE VI. — *Scarlet Fever*

YEAR	Cases	Case Rate per 100,000	Deaths	Death Rate per 100,000	Fatality Rate (Per Cent)
1926 . . . . .	11,323	268.7	117	2.8	1.0
1927 . . . . .	16,546	387.6	144	3.4	.9
1928 . . . . .	10,473	242.2	90	2.1	.9
1929 . . . . .	9,975	227.7	71	1.6	.7
1930 . . . . .	9,408	221.1	98	2.3	1.0

TABLE VII. — *Smallpox*

YEAR	Cases	Deaths
1926 . . . . .	4	—
1927 . . . . .	2	—
1928 . . . . .	19	—
1929 . . . . .	273	1
1930 . . . . .	2	—

TABLE VIII. — *Tuberculosis, Pulmonary*

YEAR	Cases	Case Rate per 100,000	Deaths	Death Rate per 100,000	Fatality Rate (Per Cent)
1926 . . . . .	5,444	129.2	2,961	70.3	54.4
1927 . . . . .	5,049	118.3	2,774	65.0	54.9
1928 . . . . .	4,873	112.7	2,690	62.2	55.2
1929 . . . . .	4,538	103.6	2,561	58.5	56.4
1930 . . . . .	4,696	110.4	2,423	56.9	51.6

TABLE IX. — *Tuberculosis, Non-Pulmonary*

YEAR	Cases	Case Rate per 100,000	Deaths	Death Rate per 100,000	Fatality Rate (Per Cent)
1926 . . . . .	874	20.7	555	13.2	63.5
1927 . . . . .	807	18.9	429	10.0	53.2
1928 . . . . .	757	17.5	433	10.0	57.2
1929 . . . . .	649	14.8	361	8.2	55.6
1930 . . . . .	587	13.8	311	7.3	53.0

TABLE X. — *Typhoid Fever*

YEAR	Cases	Case Rate per 100,000	Deaths	Death Rate per 100,000	Fatality Rate (Per Cent)
1926 . . . . .	547	13.0	61	1.4	11.1
1927 . . . . .	466	10.9	44	1.0	9.4
1928 . . . . .	310	7.2	36	.8	11.6
1929 . . . . .	307	7.0	42	1.0	13.7
1930 . . . . .	318	7.5	38	.9	11.9

TABLE XI. — *Whooping Cough*

YEAR	Cases	Case Rate per 100,000	Deaths	Death Rate per 100,000	Fatality Rate (Per Cent)
1926 . . . . .	11,547	274.0	391	9.3	3.4
1927 . . . . .	6,273	146.9	149	3.5	2.4
1928 . . . . .	8,023	185.5	208	4.8	2.6
1929 . . . . .	7,708	176.0	137	3.1	1.8
1930 . . . . .	10,750	252.6	182	4.3	1.7

TABLE XII. — *Gonorrhea and Syphilis*

YEAR	GONORRHEA		SYPHILIS			
	Cases	Case Rate per 100,000	Cases	Case Rate per 100,000	Deaths	Fatality Rate (Per Cent)
1926 . . . . .	4,920	116.8	1,904	45.1	165	3.9
1927 . . . . .	4,294	100.6	1,666	39.0	135	3.2
1928 . . . . .	4,506	104.2	1,569	36.3	164	3.8
1929 . . . . .	4,410	100.7	1,531	35.0	133	3.0
*1930 . . . . .	6,974	163.9	4,197	98.6	149	3.5

\* All forms made reportable to State Department of Public Health.

TABLE XIII. — *General Paralysis of the Insane*

YEAR	DEATHS		FIRST ADMISSIONS TO STATE INSTITUTIONS FOR MENTAL DISEASES		
	Deaths	Death Rate per 100,000	First Admissions	Rate per 100,000	Per Cent of All First Admissions
1926 . . . . .	230	5.5	232	5.5	8.0
1927 . . . . .	198	4.6	190	4.5	6.7
1928 . . . . .	204	4.7	202	4.7	6.4
1929 . . . . .	186	4.2	226	5.2	7.4
1930 . . . . .	168	3.9	227	5.3	7.2

TABLE XIV. — *Gonorrhea and Syphilis Treated in Clinics and Institutions.  
Subsidized Clinics*

YEAR	NEW CASES		Visits	Number of Clinics
	Gonorrhea	Syphilis		
1926 . . . . .	2,060	3,178	136,179	15
1927 . . . . .	2,351	3,307	160,444	15
1928 . . . . .	2,286	2,274	174,714	15
1929 . . . . .	2,238	2,163	172,777	15
1930 . . . . .	2,498	2,462	190,535	14

*Non-Subsidized Clinics*

NEW CASES				
1928 . . . . .	177	378	18,147	9
1929 . . . . .	214	446	21,485	10
1930 . . . . .	249	506	26,917	11



*Institutions*  
NEW CASES

1928 . . . . .	338	635	27
1929 . . . . .	344	660	27
1930 . . . . .	356	723	25

TABLE XV. — *Grams of Arsphenamine, Sulpharsphenamine and Neoarsphenamine Distributed*

YEAR	Arsphen- amine	Sulph- arsphenamine	Neo- arsphenamine	Total	Accumulative Total
1926 . . . . .	13,036	19,737	—	32,773	195,214
1927 . . . . .	14,010	17,230	—	31,240	226,454
1928 . . . . .	8,312	16,619	13,134	38,066	264,520
1929 . . . . .	8,753	17,634	18,146	44,533	309,053
1930 . . . . .	9,802	12,915	22,284	45,001	354,054

TABLE XVI. — *Grams of Arsphenamine, Sulpharsphenamine and Neoarsphenamine Distributed to Subsidized Clinics, Other Institutions and Physicians*

YEAR	Arsphen- amine	Sulph- arsphenamine	Neo- arsphenamine	Total
1927 . . . . .	13,075	9,812	—	22,887
1928 . . . . .	6,972	8,537	8,648	24,157
1929 . . . . .	7,328	7,481	9,615	24,624
1930 . . . . .	7,963	3,744	12,164	23,870

*Institutions*

1927 . . . . .	922	6,903	—	7,825
1928 . . . . .	1,187	6,966	3,137	11,290
1929 . . . . .	1,101	7,317	3,851	12,269
1930 . . . . .	1,711	6,509	4,013	12,233

*Physicians*

1927 . . . . .	13.2	515	—	528
1928 . . . . .	153.4	1,116	1,350	2,619
1929 . . . . .	123.4	2,836	4,681	7,640
1930 . . . . .	128.0	2,662	6,107	8,898

TABLE XVII. — *Laboratory Examinations*

	Positive	Negative	Total
Diphtheria:			
Diagnosis . . . . .	780	11,108	11,888
Release . . . . .	1,481	3,000	4,481
Tuberculosis:			
Sputum . . . . .	827	3,183	4,010
Animal inoculations . . . . .	17	159	176
Typhoid Fever:			
Widal test . . . . .	258	1,695	2,019*
Examination for typhoid bacilli:			
Blood . . . . .	5	72	77
Feces . . . . .	97	1,838	1,935
Urine . . . . .	1	1,054	1,055
Bile . . . . .	1	3	4
Gonorrhea . . . . .	1,472	5,849	7,321
Malaria . . . . .	1	57	85

## Miscellaneous:

Pneumococcus type determination . . . . .	-	-	468
Hemolytic streptococci . . . . .	-	-	1,044
Spinal fluid for meningococci . . . . .	-	-	35
Undulant fever . . . . .	13	267	280
Unclassified . . . . .	-	-	724

Total . . . . .			35,575
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\*Includes 66 atypical.

## MALARIA PREVENTION

WILSON G. SMILLIE, M.D., *Consulting Epidemiologist*

As was noted last year, the construction of the Swift Wachusett tunnel, by necessity, created conditions which might easily result in the re-introduction of malaria into Massachusetts. The work required the employment of a large number of laborers, many of whom were migratory. Some of them came from areas in which malaria was endemic. We know that the mosquito, which is chiefly responsible for the transmission of malaria in the United States, is prevalent during certain seasons in Massachusetts. It was essential, therefore, that the area be watched during the mosquito breeding season, in order that conditions might not develop which would lead to an epidemic of malaria in the camp personnel, or which might result in the establishment of small endemic foci in the environs of the tunnel.

Beginning July 12th, a weekly record of the personnel of the various camps was sent to the State Health Commissioner by the State Engineer in charge, Mr. Winsor. These data gave the place and date of birth, the place of last employment and the previous history of malaria of each employee. A record of all illness in the camps was kept by the State Engineer, and all cases of illness were reported to him at once by the camp physician. The camps were all well screened; not only the bunk houses, but the mess halls and all other occupied buildings were well protected with fine mesh wire screening. Each camp tender was required to keep the screen doors and windows in good repair.

The previous year's work showed that *anopheles quadrimaculatus*, the important transmitter of malaria, did not appear in this area until August, but *anopheles punctipennis* was found in July. The first visit to the camps was made on July first, with Dr. Leeder. Surveys were made of mosquito breeding places in the environs of the camps, and larvae catching stations were established. Search for adult mosquitoes was conducted in the bunk houses, mess halls and outhouses, an inspection of the effectiveness of the screening and also of the general sanitation of the camps was made at the same time. A detailed report with recommendations was forwarded to Mr. Winsor, the State Engineer in charge.

A second survey was made on July 22nd (with Dr. Knowlton) and a third survey was made by Dr. Knowlton on August 26th. At each visit a few *anopheles* breeding places were found, but no adults were found at any time in the camps. As the work neared completion, several of the camps were abandoned and most of the personnel was drawn from neighboring towns. The general sanitation and standards for proper screening were maintained throughout the summer. No case of malaria occurred in the personnel and the general health conditions of the workmen were satisfactory.

*Cases and Deaths, with Case and Death Rates per 100,000 Population<sup>1</sup> for all Reportable Diseases during the Year 1930*

DISEASES	Cases	Case Rate per 100,000 Population	Deaths	Death Rate per 100,000 Population	Fatality Rate (Per Cent)
Actinomycosis . . . . .	2	.04	2	.04	100.0
Anterior Poliomyelitis . . . . .	503	11.8	35	.8	7.0
Anthrax . . . . .	9	.2	1	.02	11.1
Chicken Pox . . . . .	10,490	246.5	8	.2	.1
Diphtheria . . . . .	3,322	78.1	182	4.3	5.5
Dog Bite . . . . .	5,189	122.0	—	—	—
Dysentery . . . . .	27	.6	9	.2	33.3
Encephalitis Lethargica . . . . .	50	1.2	41	1.0	82.0
Ep. Cerebrospinal Meningitis . . . . .	174	4.1	59	1.4	33.9
German Measles . . . . .	4,544	106.5	—	—	—
Gonorrhea . . . . .	6,974	163.9	7	.2	.1
Influenza . . . . .	258	6.1	270	6.3	— <sup>2</sup>
Leprosy . . . . .	—	—	—	—	—
Malaria . . . . .	42	1.0	3	.1	7.1
Measles . . . . .	27,137	637.8	137	3.2	.5
Mumps . . . . .	5,791	136.1	1	.02	.01
Ophthalmia Neonatorum <sup>3</sup> . . . . .	1,289	30.3	—	—	—
Pellagra . . . . .	12	.3	9	.2	75.0
Pneumonia, Lobar . . . . .	4,333	101.8	1,883	44.3	43.5
Rabies . . . . .	2 <sup>4</sup>	—	1	—	—
Scarlet Fever . . . . .	9,408	221.1	98	2.3	1.0
Septic Sore Throat . . . . .	422	9.9	38	.9	9.0
Smallpox . . . . .	2	.04	—	—	—
Syphilis . . . . .	4,197	98.6	149	3.5	3.6
Tetanus . . . . .	27	.6	25	.6	92.6
Trachoma . . . . .	46	1.1	—	—	—
Trichinosis . . . . .	20	.5	1	.02	5.0
Tuberculosis, Pulmonary . . . . .	4,696	110.4	2,423	56.9	51.6
Tuberculosis, Other Forms . . . . .	587	13.8	311	7.3	53.0
Tuberculosis, Hilum . . . . .	551	12.9	—	—	—
Typhoid Fever . . . . .	318	7.5	38	.9	11.9
Typhus Fever . . . . .	1	.02	—	—	—
Undulant Fever . . . . .	6	.1	—	—	—
Whooping Cough . . . . .	10,750	252.6	182	4.3	1.7
Total . . . . .	101,179	2,377.9	5,913	139.0	5.8

<sup>1</sup> Population, 1930, 4,254,884.<sup>2</sup> Incompletely reported.<sup>3</sup> Includes suppurative conjunctivitis.<sup>4</sup> Diagnosis not confirmed by laboratory examinations on one case.



## Cases and Deaths for All Reportable Diseases by Months, 1930.

	JAN.		FEB.		MARCH		APRIL		MAY		JUNE		JULY		AUGUST		SEP-TEMBER		OCTOBER		NO- VEMBER		DE- CEMBER		TOTAL	
	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths		
Actinomycosis	4	2	1	1	1	1	3	1	5	1	3	1	25	1	104	7	104	9	170	11	1	1	31	2	503	
Anterior Poliomyelitis	1697	2	1025	1	974	1	857	1	848	2	876	1	273	1	70	1	117	1	486	11	51	1	1843	1	10490	
Anthrax	562	19	362	24	278	27	283	13	236	10	203	12	134	12	181	15	166	10	302	12	258	10	347	18	3322	
Chicken Pox	355	-	253	-	347	-	466	-	638	-	689	-	569	-	553	-	458	-	336	-	239	-	27	-	5189	
Diphtheria	8	-	3	-	5	-	2	-	6	-	3	-	3	-	3	-	4	-	2	-	7	-	3	-	27	
Dog Bite	-	-	3	-	1	-	1	-	1	-	3	-	1	-	3	-	5	-	1	-	1	-	1	-	50	
Dysentery	-	-	7	-	5	-	2	-	4	-	3	-	2	-	3	-	4	-	1	-	5	-	3	-	41	
Encephalitis Lethargica	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Encephalitis Cerebrospinal	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Epidemic Cerebrospinal Meningitis	20	4	17	7	24	8	18	9	33	4	16	12	4	3	10	3	8	-	7	4	6	3	11	2	174	
German Measles	55	3	234	-	540	-	1106	-	1374	-	820	-	94	-	630	-	27	-	41	-	62	-	139	-	4544	
Gonorrhea	588	-	489	-	574	-	534	-	537	-	568	-	668	-	680	-	648	-	617	1	528	1	583	-	6974	
Influenza	49	31	30	48	50	64	45	40	12	18	8	4	3	4	4	3	4	5	11	11	13	18	21	258	270	
Malaria	1	1	1	1	1	1	2	1	1	1	7	1	5	1	4	4	9	2	2	5	5	5	5	42	3	
Measles	1153	6	3797	23	5751	24	5751	24	6448	35	4227	15	1207	10	227	1	142	2	339	5	559	2	1279	8	27137	
Mumps	1005	1	876	6	1022	1	809	1	667	1	454	1	178	-	144	1	90	2	99	2	184	2	263	1	5791	
Optic Atrophy	134	-	152	-	106	-	104	-	165	-	102	-	86	-	73	-	115	-	87	-	87	-	78	-	1289	
Ophthalmia Neonatorum	2	1	1	1	1	1	1	1	2	2	2	2	2	2	3	1	1	1	2	2	1	1	2	12	9	
Pellagra	589	227	667	270	676	275	597	295	416	161	254	96	107	51	80	45	91	47	201	106	329	143	326	167	4333	
Pneumonia, Lobar	-	-	1179	15	1175	14	1206	16	947	15	603	7	231	3	192	2	244	3	436	1	677	4	1022	5	9408	
Rabies	1496	13	19	-	194	-	40	9	19	10	19	3	17	4	9	-	19	2	6	1	19	6	17	3	422	
Scarlet Fever	44	-	1	-	1	-	1	-	1	-	1	-	1	-	1	-	1	-	1	-	1	-	1	-	2	
Septic Sore Throat	390	18	380	17	415	11	343	13	375	13	305	11	301	11	289	10	250	8	371	10	309	13	469	14	4197	
Smallpox	1	-	1	-	1	-	1	-	1	-	1	-	1	-	1	-	1	-	1	-	1	-	1	-	2	
Syphilis	5	1	9	1	3	2	3	1	4	3	4	4	4	1	2	4	5	2	2	3	1	1	2	4	27	
Tetanus	1	-	1	-	1	-	1	-	1	-	1	-	1	-	1	-	1	-	1	-	1	-	1	-	25	
Trachoma	1	-	1	-	1	-	1	-	1	-	1	-	1	-	1	-	1	-	1	-	1	-	1	-	46	
Trichinosis	1	-	1	-	1	-	1	-	1	-	1	-	1	-	1	-	1	-	1	-	1	-	1	-	20	
Tuberculosis, Pulmonary	407	182	404	198	467	227	476	251	472	252	401	197	385	194	317	184	331	167	351	227	365	176	320	168	4696	
Tuberculosis, Other Forms	57	26	51	24	45	33	72	29	38	26	49	30	34	30	37	29	47	20	45	19	41	23	51	22	587	
Tuberculosis, Hilum	84	4	71	3	32	1	30	4	88	1	30	2	82	2	22	2	22	8	24	3	28	6	46	6	551	
Typhoid Fever	25	-	14	-	9	1	20	4	10	1	16	2	16	2	62	2	48	8	34	3	37	2	27	6	318	
Typhus	3	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Undulant Fever	1710	12	1337	25	1503	30	1315	19	1171	19	774	11	680	14	551	17	517	10	304	9	397	6	491	10	10750	
Whooping Cough	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6	
Total	10474	552	9608	645	12246	724	14088	730	14514	574	10442	417	5135	343	3590	330	3479	297	4279	431	5639	416	7635	454	101179	5913

\* Diagnosis not confirmed by laboratory examinations on one case.

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## Cases and Deaths from Diseases Dangerous

Line No.	CITIES AND TOWNS IN ORDER OF POPULATION	Population estimated as of July 1, 1930	An- terior Polio- mye- litis		Chicken Pox		Diph- theria		Ep. Cere- bro- spinal Menin- gitis		Ger- man Meas- les		Gonor- rhea*	
			Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths
1	Massachusetts	4,254,884	503	35	10490	8	3322	182	174	59	4544	-	6974	7
	CITIES OF OVER 500,000													
2	Boston	781,266	123	21	2170	-	862	23	43	29	1407	-	2647	3
	CITIES OF OVER 150,000													
3	Worcester	345,829	17	1	1295	-	346	18	20	6	267	-	545	1
4	Springfield	195,539	15	1	738	-	213	9	19	6	246	-	273	-
	CITIES OF 100,000-150,000													
5	Fall River	150,290	2	-	557	-	133	9	1	-	21	-	272	1
6	Cambridge	646,616	54	1	1463	1	738	53	20	7	544	-	837	-
7	New Bedford	114,590	1	1	312	-	117	4	4	2	16	-	91	-
8	Somerville	113,342	16	-	648	-	91	1	10	2	355	-	278	-
9	Lynn	112,252	1	-	83	-	160	9	2	2	7	-	170	-
	CITIES OF 50,000-100,000													
10	Lowell	104,150	20	-	133	1	179	28	2	136	-	-	157	-
11	Lawrence	102,282	16	-	287	-	191	11	2	1	30	-	141	-
12	Quincy	561,578	64	4	1021	-	146	18	27	7	463	-	701	1
13	Newton	99,733	5	-	62	-	21	4	4	1	2	-	220	1
14	Brockton	84,648	8	-	50	-	16	8	15	3	10	-	74	-
15	Medford	72,578	13	3	102	-	7	-	1	1	78	-	77	-
16	Malden	65,887	16	1	331	-	3	-	-	-	72	-	74	-
17	Holyoke	63,720	1	-	138	-	23	-	-	-	77	-	72	-
	CITIES AND TOWNS, 25,000-50,000													
18	Pittsfield	60,317	10	-	156	-	47	-	-	-	196	-	54	-
19	Everett	58,348	9	-	121	-	24	3	1	-	20	-	69	-
20	Haverhill	56,347	2	-	61	-	5	3	6	2	8	-	61	-
21	Brookline	578,441	106	5	987	1	517	27	24	3	679	-	808	2
22	Chelsea	49,815	-	-	34	-	8	2	1	1	-	-	54	1
23	Chicopee	48,738	13	-	78	-	63	-	2	-	17	-	93	-
24	Salem	48,684	8	1	76	-	72	6	-	-	10	-	108	1
25	Fitchburg	47,730	4	-	190	-	16	-	1	-	46	-	54	-
26	Waltham	45,745	5	1	49	-	56	-	3	-	4	-	85	-
27	Taunton	44,032	1	-	22	-	21	-	4	-	-	-	28	-
28	Arlington	43,379	10	-	37	-	133	13	1	-	2	-	64	-
29	Revere	40,547	4	-	21	1	16	1	3	1	1	-	38	-
30	Watertown	39,471	11	-	87	-	4	-	2	-	104	-	44	-
31	Beverly	37,260	-	-	14	-	5	2	-	-	-	-	13	-
	CITIES AND TOWNS, 10,000-25,000													
32	Northampton	36,650	9	1	97	-	23	-	4	-	440	-	31	-
33	Gloucester	35,800	12	-	64	-	29	-	1	-	4	-	103	-
34	Melrose	35,384	8	-	200	-	27	1	1	-	46	-	46	-
35	Framingham	25,206	21	2	18	-	44	2	1	1	5	-	47	-
36	Belmont	695,349	78	2	1950	2	371	26	19	6	440	-	597	-
37	Attleboro	24,392	4	-	52	-	45	8	2	2	12	-	21	-
38	Leominster	24,245	5	-	15	-	2	-	1	-	-	-	27	-
39	North Adams	23,320	5	-	28	-	10	-	3	1	4	-	17	-
40	Peabody	22,265	6	-	116	-	3	-	-	-	-	-	9	-
41	Methuen	22,072	5	-	290	-	6	1	1	-	76	-	17	-
42	Weymouth	21,825	5	-	31	-	6	-	-	-	-	-	-	-
43	Westfield	21,795	5	-	37	-	3	-	3	1	1	-	14	-
44	Woburn	21,567	-	-	4	1	2	1	-	-	-	-	17	-
45	Gardner	21,418	7	-	13	-	24	2	2	-	3	-	34	-
46	Winthrop	21,092	2	-	54	-	4	1	1	-	2	-	11	-
47	West Springfield	21,062	3	-	19	-	5	-	-	-	-	-	17	-
48	Milton	19,797	-	-	36	-	7	-	2	1	1	-	9	-
49	Wakefield	19,486	2	1	17	-	9	1	-	-	4	-	15	-
50	Braintree	19,432	-	-	80	-	3	1	2	-	11	-	24	-
51	Marlboro	16,886	1	-	122	-	1	-	-	-	11	-	50	-
52	Greenfield	16,752	-	-	3	-	6	-	-	-	-	-	13	-
53	Dedham	16,612	-	-	70	-	4	-	-	-	24	-	11	-
54	Norwood	16,353	2	-	29	-	10	-	-	-	2	-	18	-
55	Newburyport	15,837	1	-	27	-	5	-	1	-	5	-	18	-
56	Saugus	15,555	1	-	22	-	2	-	-	-	-	-	24	-
57	Milford	15,512	-	-	175	-	5	-	-	-	7	-	20	-
58	Southbridge	15,196	10	-	9	-	3	1	-	-	-	-	8	-
59	Natick	15,093	2	-	14	-	5	-	-	-	2	-	7	-
60	Plymouth	15,057	-	-	86	-	84	3	-	-	8	-	16	-
61	Danvers	14,797	4	-	14	-	6	-	-	-	34	-	17	-
62	Webster	14,739	-	-	4	-	1	-	-	-	1	-	4	-
63	Winchester	14,203	1	-	14	-	2	-	-	-	3	-	5	-
64	Clinton	13,624	2	-	40	-	3	-	-	-	28	-	6	-
65	Amesbury	13,035	7	-	26	-	11	-	-	-	7	-	4	-
66	Wellesley	13,014	-	-	27	-	18	3	-	-	5	-	15	-
67	Easthampton	12,972	-	-	11	1	1	-	-	-	-	-	12	-
68		12,776	-	-	20	-	7	-	-	-	8	-	15	-
		12,749	2	-	7	-	-	-	-	-	-	-	4	-
		12,656	-	-	83	-	17	1	1	1	-	-	2	-
		11,932	-	-	22	-	10	2	-	-	2	-	19	-
		11,557	3	1	156	-	1	-	-	-	21	-	6	-
		11,310	-	-	1	-	2	-	-	-	2	-	14	-

\* 299 cases of gonorrhea and 124 cases of syphilis, residence not stated.

to the Public Health, 1930

Influenza		Lobar Pneumonia		Measles		Mumps		Ophthalmia Neonatorum		Scarlet Fever		Syphilis*		Tuberculosis, Pulmonary		Tuberculosis, Other Forms		Typhoid Fever		Whooping Cough		Line No.
Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	
258	270	4333	1883	27137	137	5791	1	1289	-	9408	98	4197	149	4696	2423	587	311	318	38	10750	182	1
83	13	1468	489	8624	62	1699	-	738	-	2356	40	1819	55	1530	527	216	84	40	7	2241	32	2
13	27	418	168	3070	8	197	-	128	-	895	9	287	11	553	155	36	27	13	1	944	12	
7	10	222	87	3001	8	27	-	75	-	633	9	184	4	237	99	23	19	6	-	506	5	3
6	17	196	81	69	-	170	-	53	-	262	-	103	7	146	56	13	8	7	-	438	7	4
35	30	597	211	2767	11	609	-	140	-	1195	9	569	21	662	283	111	44	37	9	1466	27	
13	11	105	35	44	-	82	-	41	-	153	-	55	8	120	94	27	16	11	3	180	7	5
15	3	195	66	1426	7	424	-	11	-	425	-	131	6	176	70	22	6	7	1	397	4	6
2	9	75	28	54	-	7	-	70	-	96	2	203	6	166	77	33	15	3	2	22	2	7
2	1	125	37	815	4	54	-	11	-	406	6	72	-	109	25	17	6	11	2	165	3	8
3	6	97	45	418	-	42	-	7	-	115	1	108	1	91	17	12	1	5	1	652	11	9
25	33	420	204	2816	7	621	-	187	-	1103	11	419	11	485	176	96	53	59	7	1233	21	
6	1	40	20	47	-	12	-	7	-	166	5	110	5	88	50	15	6	14	5	23	7	10
8	7	54	36	264	-	36	-	89	-	15	-	61	1	71	19	17	6	21	-	56	1	11
6	7	49	38	764	3	77	-	1	-	346	1	31	-	95	20	46	2	3	-	94	3	12
2	8	41	25	718	1	158	-	4	-	78	-	41	2	29	7	1	2	13	1	386	2	13
2	5	58	19	114	-	24	-	82	-	130	3	67	1	41	16	7	6	4	-	131	2	14
5	1	55	13	625	-	209	-	1	-	205	1	40	-	40	16	3	2	1	-	277	2	15
-	2	73	14	272	2	97	-	3	-	87	1	42	3	68	20	4	3	1	-	207	2	16
1	2	50	39	12	1	8	-	-	-	76	-	27	1	53	28	3	6	2	1	59	2	17
63	40	592	270	3499	16	752	-	24	-	1176	12	378	17	554	228	53	30	48	5	1542	33	
2	1	30	33	7	-	-	-	-	-	109	-	25	-	35	19	2	2	2	-	14	-	18
6	3	61	17	285	1	32	-	1	-	143	2	39	1	54	13	4	-	4	1	100	-	19
12	3	59	23	23	-	12	-	1	-	36	-	42	2	52	12	1	3	2	-	146	3	20
12	3	36	12	559	1	152	-	-	-	170	1	41	-	27	18	5	1	3	-	221	1	21
12	6	91	38	126	-	71	-	7	-	131	2	28	7	63	23	5	4	7	1	45	2	22
1	6	24	13	6	-	7	-	1	-	21	-	8	-	65	35	5	3	3	-	45	1	23
6	1	39	24	307	8	12	-	1	-	33	3	35	3	37	7	5	3	3	-	37	2	24
6	-	69	29	327	1	2	-	3	-	26	-	22	-	40	26	8	3	-	-	73	5	25
6	7	38	21	696	4	139	-	4	-	93	2	28	1	46	19	1	-	15	2	198	8	26
-	2	3	21	-	-	-	-	-	-	25	2	5	3	11	25	3	7	1	-	2	5	27
8	3	32	10	604	-	63	-	1	-	161	-	21	-	43	15	1	2	3	-	264	1	28
2	2	27	13	149	1	115	-	2	-	39	-	51	-	33	3	5	-	1	1	64	2	29
2	2	43	9	259	-	81	-	1	-	116	-	15	-	31	9	3	1	2	1	273	3	30
1	1	40	7	151	-	66	-	1	-	73	-	18	-	17	4	5	1	2	-	60	-	31
28	69	572	272	2944	13	1443	1	54	-	1529	11	503	12	664	321	55	26	57	4	1871	31	
1	-	40	13	8	-	6	1	1	-	17	-	3	3	43	56	2	1	1	1	73	-	32
-	-	13	9	10	1	2	-	12	-	115	1	12	-	19	7	2	-	-	-	4	1	33
-	-	31	5	39	-	72	-	13	-	37	-	11	-	23	6	4	2	1	-	26	-	34
-	-	16	10	47	-	9	-	3	-	96	2	16	-	19	9	2	-	7	-	187	1	35
2	2	23	9	319	-	28	-	1	-	100	2	7	-	11	7	-	-	6	-	130	2	36
2	1	21	7	12	-	4	-	-	-	37	-	2	1	41	30	7	-	-	-	55	4	37
1	3	27	9	348	2	2	-	-	-	85	-	5	1	17	2	5	2	-	-	60	1	38
-	4	18	5	13	1	-	-	-	-	14	-	7	-	10	3	2	-	2	-	6	-	39
-	-	8	8	119	-	171	-	-	-	20	-	8	-	20	3	-	1	2	1	33	-	40
1	-	7	3	43	-	55	-	-	-	10	-	6	-	18	3	1	-	-	-	40	-	41
1	2	31	16	42	1	20	-	77	-	49	-	13	-	30	10	2	1	1	-	16	1	42
2	5	10	6	53	1	29	-	-	-	95	-	6	-	4	6	-	-	3	-	37	2	44
4	4	30	16	142	-	154	-	-	-	17	1	16	2	27	10	3	3	1	1	40	1	45
-	-	16	6	105	-	38	-	2	-	95	1	17	-	19	2	1	1	1	-	31	-	46
-	-	5	9	-	-	-	-	-	-	14	-	4	-	9	2	1	-	-	-	4	-	47
-	-	5	2	45	1	44	-	-	-	27	-	10	-	8	5	-	-	2	-	14	-	48
3	4	13	4	290	-	64	-	-	-	23	-	13	-	10	-	2	3	1	-	26	1	49
1	5	26	11	68	1	24	-	-	-	34	-	3	-	19	48	1	-	-	-	67	-	50
1	4	22	11	3	-	430	-	3	-	123	-	6	-	9	5	-	1	1	-	3	-	51
1	-	1	5	4	-	11	-	-	-	25	-	7	-	6	2	-	-	-	-	109	1	52
-	-	22	8	5	-	6	-	1	-	9	-	3	-	10	3	4	1	12	-	50	1	53
6	1	11	4	4	-	-	-	1	-	6	-	11	1	9	4	-	2	1	-	42	1	54
1	-	7	3	13	-	13	-	-	-	11	-	8	-	4	1	1	1	-	-	17	1	55
-	-	7	5	15	-	2	-	1	-	55	1	6	-	24	8	1	2	2	-	58	1	57
-	-	15	6	144	2	-	-	-	-	3	-	3	1	7	6	-	-	-	-	1	1	58
-	-	7	5	60	-	4	-	-	-	19	-	2	-	6	4	2	-	4	-	39	-	59
-	-	14	5	25	-	78	-	-	-	7	-	5	-	17	6	1	-	1	-	29	2	60
-	-	2	10	184	-	13	-	2	-	23	-	13	2	10	18	1	-	1	-	15	-	61
-	-	1	-	3	1	1	-	-	-	3	-	5	-	13	4	-	-	-	-	5	-	62
-	-	6	4	122	-	16	-	-	-	23	-	1	-	6	4	1	1	-	-	67	-	63
-	-	13	9	5	-	-	-	-	-	65	-	-	-	5	1	-	2	1	-	16	-	64
-	-	19	4	14	-	-	-	3	-	15	-	2	-	11	4	-	-	2	-	30	-	65
-	-	2	10	6	7	-	-	-	-	44	2	19	1	7	4	1	-	-	-	108	-	66
-	-	11	1	104	1	25	-	1	-	28	-	6	-	2	1	-	-	1	-	192	-	67
1	1	6	4	1	-	-	-	-	-	2	-	8	-	4	2	-	-	-	-	1	1	68

## Cases and Deaths from Diseases Dangerous

Line No.	CITIES AND TOWNS IN ORDER OF POPULATION	Popu- lation estimated as of July 1, 1930	An- terior Polio- mye- litis		Chicken Pox		Diph- theria		Ep. Cere- bro- spinal Menin- gitis		Ger- man Mea- sles		Gonor- rhea	
			Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths
69	Fairhaven . . . . .	10,957	1	-	43	-	15	-	-	-	6	-	14	-
70	Needham . . . . .	10,937	1	-	27	-	6	-	-	-	131	-	2	-
71	Athol . . . . .	10,730	-	-	9	-	1	1	-	-	2	-	13	-
72	Swampscott . . . . .	10,415	-	-	74	-	6	-	-	-	13	-	6	-
73	North Attleboro . . . . .	10,217	-	-	6	-	-	-	-	-	-	-	5	-
74	Stoneham . . . . .	10,108	1	-	17	-	10	-	-	-	4	-	8	-
	CITIES AND TOWNS, 5,000-10,000	550,614	30	1	747	1	187	9	16	-	208	-	273	-
75	Andover . . . . .	9,953	3	-	23	-	1	1	-	-	1	-	14	-
76	Reading . . . . .	9,820	1	1	4	-	17	-	1	-	1	-	9	-
77	Northbridge . . . . .	9,696	2	-	4	-	14	-	1	-	-	-	6	-
78	Lexington . . . . .	9,551	2	-	11	-	7	1	3	-	31	-	4	-
79	Palmer . . . . .	9,504	-	-	1	-	4	1	-	-	-	-	2	-
80	Bridgewater . . . . .	9,035	-	-	9	-	1	-	-	-	3	-	3	-
81	Ludlow . . . . .	8,879	-	-	29	-	-	-	2	-	-	-	6	-
82	Dartmouth . . . . .	8,766	2	-	11	-	16	1	-	-	-	-	4	-
83	Marblehead . . . . .	8,680	2	-	25	-	5	-	1	-	4	-	17	-
84	Middleboro . . . . .	8,582	1	-	173	-	1	-	-	-	4	-	4	-
85	Hudson . . . . .	8,485	1	-	12	-	1	-	-	-	-	-	2	-
86	Stoughton . . . . .	8,221	-	-	22	-	-	-	1	-	5	-	7	-
87	Montague . . . . .	8,086	-	-	7	1	-	-	-	-	-	-	5	-
88	Whitman . . . . .	7,627	-	-	2	-	1	-	-	-	-	-	6	-
89	Rockland . . . . .	7,502	-	-	3	-	2	-	-	-	-	-	6	-
90	Concord . . . . .	7,498	-	-	35	-	2	-	-	-	6	-	7	-
91	Barnstable . . . . .	7,345	1	-	14	-	2	-	-	-	50	-	4	-
92	Ware . . . . .	7,323	-	-	-	-	3	-	-	-	-	-	8	-
93	Walpole . . . . .	7,311	2	-	9	-	3	-	-	-	-	-	3	-
94	Agawam . . . . .	7,135	-	-	-	-	-	-	-	-	-	-	6	-
95	Maynard . . . . .	7,123	-	-	5	-	-	-	-	-	-	-	5	-
96	Chelmsford . . . . .	7,044	-	-	12	-	1	-	-	-	-	-	4	-
97	Grafton . . . . .	7,032	-	-	-	-	-	-	-	-	-	-	3	-
98	Franklin . . . . .	7,027	-	-	12	-	2	1	-	-	49	-	7	-
99	Millbury . . . . .	6,982	-	-	36	-	4	-	-	-	1	-	4	-
100	North Andover . . . . .	6,967	-	-	28	-	1	-	-	-	20	-	-	-
101	Shrewsbury . . . . .	6,964	-	-	6	-	1	-	-	-	-	-	5	-
102	Dracut . . . . .	6,937	-	-	-	-	-	1	-	-	-	-	-	-
103	South Hadley . . . . .	6,781	-	-	-	-	-	-	1	-	-	-	-	-
104	Hingham . . . . .	6,681	-	-	-	-	7	-	1	-	2	-	3	-
105	Randolph . . . . .	6,598	-	-	6	-	2	-	-	-	2	-	5	-
106	Westboro . . . . .	6,412	-	-	2	-	3	-	-	-	-	-	2	-
107	Mansfield . . . . .	6,353	1	-	25	-	3	-	-	-	4	-	4	-
108	Uxbridge . . . . .	6,290	-	-	6	-	44	3	2	-	-	-	13	-
109	Spencer . . . . .	6,260	-	-	3	-	17	-	-	-	-	-	2	-
110	Auburn . . . . .	6,207	-	-	65	-	-	-	-	-	-	-	7	-
111	Winchendon . . . . .	6,203	-	-	-	-	-	-	-	-	1	-	23	-
112	Billerica . . . . .	5,928	1	-	11	-	-	-	-	-	-	-	1	-
113	Great Barrington . . . . .	5,911	-	-	6	-	1	-	1	-	-	-	4	-
114	Amherst . . . . .	5,884	-	-	33	-	1	-	1	-	1	-	6	-
115	Abington . . . . .	5,872	2	-	-	-	3	-	-	-	-	-	5	-
116	Canton . . . . .	5,812	-	-	30	-	2	-	-	-	2	-	5	-
117	Wareham . . . . .	5,690	1	-	6	-	3	-	-	-	-	-	24	-
118	Tewksbury . . . . .	5,615	1	-	10	-	-	-	-	-	-	-	1	-
119	Ipswich . . . . .	5,576	4	-	15	-	9	-	-	-	-	-	3	-
120	Somerset . . . . .	5,426	-	-	-	-	-	1	-	-	-	-	3	-
121	Orange . . . . .	5,376	-	-	2	-	-	-	-	-	-	-	4	-
122	Foxboro . . . . .	5,367	2	-	23	-	3	-	-	-	9	-	2	-
123	Easton . . . . .	5,297	1	-	11	-	-	-	-	-	12	-	5	-
	CITIES AND TOWNS, 2,500-5,000	195,152	15	-	393	1	96	6	2	-	190	-	129	-
124	Monson . . . . .	4,910	-	-	-	-	-	-	-	-	-	-	1	-
125	Falmouth . . . . .	4,827	-	-	30	-	24	-	-	-	3	-	12	-
126	Seekonk . . . . .	4,790	-	-	-	-	6	1	-	-	1	-	-	-
127	Blackstone . . . . .	4,668	-	-	-	-	-	-	-	-	-	-	-	-
128	Longmeadow . . . . .	4,491	-	-	17	-	-	-	-	-	-	-	2	-
129	Leicester . . . . .	4,461	-	-	-	-	-	-	-	-	-	-	2	-
130	Westport . . . . .	4,417	-	-	9	-	1	-	-	-	1	-	1	-
131	Dudley . . . . .	4,249	-	-	25	-	-	-	-	-	-	-	-	-
132	Dalton . . . . .	4,226	-	-	-	-	-	-	-	-	-	-	-	-
133	Templeton . . . . .	4,149	-	-	9	-	-	-	-	-	-	-	10	-
134	Acushnet . . . . .	4,090	-	-	2	-	2	-	-	-	-	-	4	-
135	Medfield . . . . .	4,075	-	-	1	-	-	-	-	-	4	-	6	-
136	Lee . . . . .	4,061	-	-	-	-	2	-	-	-	-	-	3	-
137	Wilmington . . . . .	4,037	5	-	-	-	7	1	-	-	-	-	8	-
138	Swansea . . . . .	3,975	-	-	8	-	-	-	-	-	-	-	-	-
139	Oxford . . . . .	3,939	-	-	12	-	-	-	-	-	-	-	3	-
140	Williamstown . . . . .	3,895	-	-	-	-	-	-	1	-	-	-	2	-



## to the Public Health, 1930 — Continued

Influenza		Lobar Pneumonia		Measles		Mumps		Ophthalmia Neonatorum		Scarlet Fever		Syphilis		Tuberculosis, Pulmonary		Tuberculosis, Other Forms		Typhoid Fever		Whooping Cough		Line No.
Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	
-	1	-	9	3	24	-	1	-	5	-	11	-	13	-	16	1	2	-	-	22	-	69
-	2	8	4	221	10	-	6	-	1	-	19	-	1	-	5	6	2	-	-	37	1	70
-	3	1	1	4	-	-	6	-	1	-	11	-	1	-	6	2	1	-	-	7	2	71
-	-	8	5	17	-	-	11	-	2	-	14	-	7	-	2	4	1	-	-	116	4	72
-	1	-	2	-	-	-	-	-	-	-	16	-	1	-	4	6	-	-	-	4	-	73
-	-	5	4	119	53	-	-	-	-	-	9	-	6	-	5	1	-	-	-	42	2	74
4	28	136	108	1753	9	183	-	11	-	523	1	138	5	260	121	13	25	26	2	735	11	75
-	1	6	2	14	2	-	-	-	-	-	7	-	4	-	3	3	-	-	-	64	-	76
-	-	1	1	17	-	-	-	-	-	-	7	-	6	-	10	5	2	-	-	-	-	77
-	1	7	3	2	-	-	14	-	-	-	7	-	1	-	6	3	-	-	-	4	-	78
-	1	5	1	237	1	5	-	-	-	-	31	-	4	-	7	3	1	1	113	2	79	
-	1	3	4	5	-	-	-	-	-	-	3	-	-	-	19	4	2	3	-	4	-	80
-	1	4	2	229	2	-	-	-	-	-	13	-	5	1	26	13	-	4	-	47	1	81
-	-	1	1	1	-	-	-	-	-	-	3	-	7	-	7	1	-	1	-	24	-	82
-	1	5	1	3	-	-	1	-	5	-	6	-	7	-	13	5	2	-	-	8	-	83
-	2	4	3	20	-	-	4	-	1	-	6	-	5	-	7	2	-	-	-	16	-	84
-	1	2	4	3	20	-	-	-	-	-	59	-	1	-	2	-	-	1	3	38	-	85
-	1	1	3	9	21	-	2	-	-	-	14	-	-	-	8	4	1	2	-	1	-	86
-	1	4	3	9	-	-	-	-	-	-	31	-	4	-	5	3	-	-	-	15	-	87
-	1	2	2	-	-	-	2	-	-	-	10	-	5	-	2	3	-	2	-	1	-	88
-	2	4	2	2	-	-	2	-	-	-	27	-	8	-	3	-	1	1	-	-	-	89
-	2	1	4	167	-	-	5	-	-	-	3	-	2	-	4	1	-	-	-	32	-	90
-	2	2	5	7	-	-	1	-	-	-	31	-	1	2	5	-	-	-	-	15	1	91
-	1	-	2	1	-	-	-	-	-	-	3	-	-	-	6	3	-	1	-	-	-	92
-	-	2	13	-	16	-	-	-	-	-	20	-	4	-	8	2	-	2	-	8	-	93
-	-	2	-	-	-	-	-	-	-	-	11	-	2	-	2	1	-	-	-	-	-	94
-	-	-	25	-	-	-	-	-	-	-	-	-	-	-	7	1	-	-	-	-	-	95
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-	-	-	-	-	-	-	-	-	-	-	-	3	-	-	-	-	-	-	-	-	1	97
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4	11	59	79	868	2	158	-	6	-	333	1	74	4	106	98	1	10	15	2	332	8	123
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3	-	3	2	-	-	-	-	-	-	5	-	-	-	-	-	1	-	-	-	-	-	129
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-	-	2	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	131
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## to the Public Health, 1930 — Continued

Influenza		Lobar Pneumonia		Measles		Mumps		Ophthalmia Neonatorum		Scarlet Fever		Syphilis		Tuberculosis, Pulmonary		Tuberculosis, Other Forms		Typhoid Fever		Whooping Cough		Line No.
Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	
-	-	7	2	66	-	-	-	1	-	-	-	-	-	5	6	-	-	-	-	4	-	141
-	-	1	1	218	-	-	-	-	-	-	-	-	-	3	4	-	-	-	-	5	-	142
-	-	3	1	4	-	28	-	1	-	-	-	-	-	1	1	-	-	-	-	-	-	143
-	-	-	3	-	-	-	-	-	-	-	-	-	-	1	1	-	-	-	-	-	-	144
-	-	9	7	1	1	-	-	-	-	-	-	-	-	1	3	-	-	-	-	-	-	145
-	-	-	-	8	-	-	-	-	-	-	-	-	-	1	7	-	-	-	-	6	-	146
-	-	-	-	3	-	-	-	-	-	-	-	-	-	1	1	-	-	-	-	4	1	147
-	1	-	3	3	-	-	-	-	-	-	-	-	-	3	3	-	-	-	-	4	-	148
-	-	-	1	3	-	4	-	-	-	-	-	-	-	1	1	-	1	-	-	-	-	149
-	-	-	2	8	-	-	-	1	-	-	-	1	1	12	7	-	-	-	6	-	-	150
-	-	-	1	20	-	36	-	-	-	-	-	2	-	5	-	-	-	11	-	-	-	151
-	-	-	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	14	-	-	-	152
-	-	-	1	8	-	-	-	-	-	-	-	1	-	1	-	-	-	5	-	-	-	153
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-	-	-	-	-	-	-	-	-	-	4	-	-	-	-	1	-	-	-	-	1	-	203
-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	2	-	-	-	-	-	-	204
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## to the Public Health, 1930 — Concluded

Influenza		Lobar Pneumonia		Measles		Mumps		Ophthalmia Neonatorum		Scarlet Fever		Syphilis		Tuberculosis, Pulmonary		Tuberculosis, Other Forms		Typhoid Fever		Whooping Cough		Line No.
Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	
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-	-	-	1	1	13	-	-	-	-	1	-	-	-	-	1	-	-	-	-	-	-	292
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	293
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-	-	-	-	2	-	2	-	-	-	7	-	-	-	-	-	-	-	-	-	-	-	305
1	-	-	-	9	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	306
-	-	-	-	1	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	10	-	307
-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	1	-	-	-	-	-	-	308
-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	309
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-	-	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	320
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-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	1	323
-	-	-	-	1	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	324
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-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	333
-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	334
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	335
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	336
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	337
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	338
-	-	-	-	45	1	1	-	-	-	1	-	-	-	-	-	-	-	-	-	50	1	339
-	-	-	-	-	-	1	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	340
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	341
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	1	-	342
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	343
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	344
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	345
-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	346
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	347
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	348
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	349
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	350
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	351
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	352
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	353
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	354
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	355
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	356
-	-	14	17	25	3	-	-	-	-	4	-	-	-	10	37	121	3	6	-	1	-	357

In addition to the foregoing there occurred 2 cases of *actinomycosis* with 2 deaths:

	Cases	Deaths
Boston . . . . .	1	1
N. Reading . . . . .	1	1

9 cases of *anthrax* with 1 death:

Boston . . . . .	1	1
Lawrence . . . . .	1	—
Lynn . . . . .	3	—
Methuen . . . . .	1	—
Peabody . . . . .	2	—
Springfield . . . . .	1	—

5,189 cases of dog bite:

Acushnet . . . . .	1	—
Adams . . . . .	8	—
Agawan . . . . .	9	—
Amesbury . . . . .	5	—
Amherst . . . . .	16	—
Andover . . . . .	6	—
Arlington . . . . .	104	—
Ashfield . . . . .	1	—
Ashland . . . . .	3	—
Athol . . . . .	13	—
Attleboro . . . . .	30	—
Barnstable . . . . .	10	—
Barre . . . . .	2	—
Bellingham . . . . .	3	—
Belmont . . . . .	57	—
Beverly . . . . .	13	—
Billerica . . . . .	12	—
Boston . . . . .	1,633	—
Boylston . . . . .	1	—
Braintree . . . . .	22	—
Bridgewater . . . . .	7	—
Brockton . . . . .	31	—
Brookline . . . . .	24	—
Cambridge . . . . .	283	—
Canton . . . . .	16	—
Chelmsford . . . . .	10	—
Chelsea . . . . .	80	—
Cheshire . . . . .	1	—
Chicopee . . . . .	49	—
Clinton . . . . .	10	—
Cohasset . . . . .	1	—
Concord . . . . .	1	—
Danvers . . . . .	24	—
Dartmouth . . . . .	18	—
Dedham . . . . .	4	—
Dighton . . . . .	2	—
Dudley . . . . .	1	—
Duxbury . . . . .	2	—
East Longmeadow . . . . .	5	—
Easton . . . . .	5	—
Everett . . . . .	47	—
Fairhaven . . . . .	11	—
Fall River . . . . .	148	—
Falmouth . . . . .	1	—
Fitchburg . . . . .	13	—
Foxborough . . . . .	5	—
Framingham . . . . .	21	—
Franklin . . . . .	5	—
Georgetown . . . . .	1	—
Gloucester . . . . .	34	—
Greenfield . . . . .	13	—
Groveland . . . . .	4	—
Hanson . . . . .	2	—
Harvard . . . . .	1	—
Haverhill . . . . .	87	—
Holden . . . . .	1	—
Holyoke . . . . .	1	—
Hudson . . . . .	1	—
Ipswich . . . . .	2	—
Lancaster . . . . .	2	—
Lawrence . . . . .	100	—
Lee . . . . .	3	—
Leicester . . . . .	6	—
Lenox . . . . .	11	—
Leominster . . . . .	2	—
Lexington . . . . .	40	—
Lincoln . . . . .	2	—
Lowell . . . . .	201	—
Ludlow . . . . .	2	—
Lunenburg . . . . .	1	—
Lynn . . . . .	99	—
Malden . . . . .	62	—
Mansfield . . . . .	18	—

	Cases	Deaths
Marblehead . . . . .	2	—
Marion . . . . .	4	—
Marlborough . . . . .	12	—
Marshfield . . . . .	1	—
Mattapoisett . . . . .	5	—
Medford . . . . .	54	—
Melrose . . . . .	10	—
Merrimac . . . . .	1	—
Methuen . . . . .	39	—
Middleborough . . . . .	1	—
Milford . . . . .	35	—
Millbury . . . . .	10	—
Millis . . . . .	11	—
Milton . . . . .	11	—
Montague . . . . .	1	—
Needham . . . . .	29	—
New Bedford . . . . .	88	—
New Marlborough . . . . .	2	—
Newburyport . . . . .	18	—
Newton . . . . .	30	—
Norfolk . . . . .	1	—
North Adams . . . . .	8	—
North Andover . . . . .	1	—
North Reading . . . . .	1	—
Northampton . . . . .	21	—
Northborough . . . . .	1	—
Northbridge . . . . .	4	—
Norwood . . . . .	2	—
Palmer . . . . .	4	—
Peabody . . . . .	36	—
Pelham . . . . .	1	—
Phillipston . . . . .	1	—
Pittsfield . . . . .	2	—
Quincy . . . . .	39	—
Randolph . . . . .	2	—
Revere . . . . .	47	—
Salem . . . . .	10	—
Saugus . . . . .	9	—
Scituate . . . . .	1	—
Seekonk . . . . .	3	—
Sharon . . . . .	5	—
Shirley . . . . .	3	—
Somerville . . . . .	90	—
Southbridge . . . . .	1	—
Southwick . . . . .	1	—
Spencer . . . . .	8	—
Springfield . . . . .	362	—
Sterling . . . . .	1	—
Stoneham . . . . .	40	—
Stoughton . . . . .	15	—
Swampscott . . . . .	29	—
Swansea . . . . .	4	—
Taunton . . . . .	4	—
Templeton . . . . .	6	—
Tyngsborough . . . . .	2	—
Walpole . . . . .	5	—
Waltham . . . . .	45	—
Wareham . . . . .	6	—
Wayland . . . . .	8	—
Wellesley . . . . .	29	—
West Springfield . . . . .	9	—
Westborough . . . . .	2	—
Westfield . . . . .	29	—
Westford . . . . .	2	—
Weston . . . . .	6	—
Westport . . . . .	3	—
Weymouth . . . . .	10	—
Wilmington . . . . .	3	—
Winchendon . . . . .	1	—
Winchester . . . . .	18	—
Winthrop . . . . .	43	—
Woburn . . . . .	3	—
Worcester . . . . .	365	—
Wrentham . . . . .	3	—

27 cases of *dysentery* with 9 deaths:

<i>Amebic</i>		
Worcester . . . . .	3	5
<i>Bacillary</i>		
Boston . . . . .	1	2
Cambridge . . . . .	3	1
Chelsea . . . . .	1	—
Danvers . . . . .	2	—
Everett . . . . .	1	—
Fall River . . . . .	1	—
Lynn . . . . .	2	—
Worcester . . . . .	8	1

	Cases	Deaths		Cases	Deaths
<i>Not Stated</i>			Boston	79	15
Concord	1	—	Braintree	3	—
Lowell	1	—	Brockton	2	2
Melrose	1	—	Brookfield	1	—
Revere	1	—	Brookline	2	1
Waltham	1	—	Cambridge	8	1
			Charlton	2	—
50 cases of <i>encephalitis lethargica</i>			Concord	1	—
with 41 deaths:			Danvers	2	—
Amesbury	—	1	Easthampton	2	—
Athol	1	1	Everett	3	—
Barre	—	1	Fairhaven	1	—
Beverly	1	1	Fall River	3	—
Boston	9	6	Fitchburg	1	1
Brockton	—	2	Greenfield	1	—
Brookline	1	1	Groton	1	—
Cambridge	2	—	Hamilton	4	—
Clinton	1	1	Haverhill	3	—
Colrain	—	1	Holbrook	1	—
Danvers	1	2	Holyoke	2	—
Everett	2	2	Ipswich	2	—
Greenfield	2	1	Lawrence	4	—
Haverhill	1	—	Leominster	2	—
Holden	1	—	Lexington	—	1
Holyoke	—	1	Lowell	15	3
Lowell	1	1	Lynn	1	—
Lynn	2	—	Malden	2	—
Marblehead	1	—	Marlborough	1	—
Marlborough	1	—	Medford	4	1
Montague	—	1	Melrose	1	—
Newburyport	—	1	Milford	2	2
Newton	1	1	Milton	2	—
Northampton	6	1	Natick	4	—
Pittsfield	1	—	Needham	1	—
Plymouth	1	1	New Bedford	1	—
Salem	2	2	Newton	1	—
Somerset	—	1	Northampton	3	—
Somerville	—	1	Norwood	1	—
Spencer	—	1	Pittsfield	1	—
Springfield	4	4	Plymouth	1	—
Sterling	1	—	Quincy	5	1
Tyngsborough	1	—	Randolph	2	—
Westfield	1	—	Revere	1	—
West Bridgewater	1	—	Salem	2	1
Worcester	4	4	Saugus	2	—
Wrentham	—	1	Shirley	7	—
			Somerville	3	1
42 cases of <i>malaria</i> with 3 deaths:			Springfield	3	1
Belmont	1	—	Stoughton	—	1
Boston	6	2	Swampscott	1	—
Brookline	1	1	Taunton	2	—
Chelsea	21 <sup>1</sup>	—	Walpole	1	—
Easton	1	—	Waltham	3	2
Foxborough	4 <sup>2</sup>	—	Watertown	2	—
Haverhill	1	—	West Springfield	1	1
Lowell	1	—	Westborough	1	—
Newton	1	—	Westfield	1	—
Quincy	1	—	Whitman	1	—
Springfield	2	—	Wilbraham	17	—
Uxbridge	1	—	Winchendon	1	—
Worcester	1	—	Winchester	1	1
			Winthrop	1	—
12 cases of <i>pellagra</i> with 9 deaths:			Worcester	5	1
Boston	8	2			
Concord	1	—	2 cases of <i>smallpox</i> :		
Hanson	—	1	Agawam	1	—
Lawrence	1	—	Palmer	1	—
Melrose	—	1			
New Bedford	—	1	27 cases of <i>tetanus</i> with 25 deaths:		
Pittsfield	1	1	Amherst	—	1
Taunton	—	1	Beverly	1	—
Tewksbury State Infirmary	—	1	Boston	5	10
Worcester	1	1	Braintree	1	—
			Cambridge	1	1
2 cases of <i>rabies</i> with 1 death:			Danvers	1	—
Quincy	1	1	Everett	2	—
Worcester	1 <sup>3</sup>	—	Fall River	—	1
			Framingham	1	1
422 cases of <i>septic sore throat</i> with			Greenfield	1	1
38 deaths:			Holyoke	—	1
Adams	4	—	Lawrence	1	—
Amesbury	1	—	Lexington	1	—
Amherst	1	—	Lynn	1	1
Arlington	1	—	Marlborough	—	1
Ayer	178	—	Medford	2	—
Belmont	1	—	Natick	1	—
Beverly	2	1	New Bedford	2	1
			Newton	—	1



	Cases	Deaths		Cases	Deaths
Norwood . . . . .	1	1	Clinton . . . . .	3	—
Somerville . . . . .	1	1	Easthampton . . . . .	2	—
Springfield . . . . .	1	—	Everett . . . . .	4	—
Watertown . . . . .	1	—	Fairhaven . . . . .	1	—
Weymouth . . . . .	—	1	Fall River . . . . .	11	—
Winchester . . . . .	—	1	Fitchburg . . . . .	14	—
Worcester . . . . .	2	1	Foxborough . . . . .	1	—
46 cases of <i>trachoma</i> :			Framingham . . . . .	5	—
Arlington . . . . .	1	—	Gardner . . . . .	2	—
Boston . . . . .	27	—	Gloucester . . . . .	1	—
Brockton . . . . .	1	—	Holden . . . . .	1	—
Cambridge . . . . .	2	—	Holyoke . . . . .	5	—
Everett . . . . .	1	—	Hudson . . . . .	3	—
Fitchburg . . . . .	1	—	Lawrence . . . . .	6	—
Gardner . . . . .	1	—	Leominster . . . . .	2	—
Lawrence . . . . .	1	—	Lowell . . . . .	4	—
Lowell . . . . .	1	—	Ludlow . . . . .	21	—
Lynn . . . . .	1	—	Lynn . . . . .	5	—
Rockland . . . . .	1	—	Malden . . . . .	1	—
Somerville . . . . .	1	—	Marion . . . . .	6	—
Springfield . . . . .	4	—	Medford . . . . .	36	—
Watertown . . . . .	3	—	McClure . . . . .	2	—
20 cases of <i>trichinosis</i> with 1			Monson . . . . .	3	—
death:			Natick . . . . .	1	—
Attleboro . . . . .	1	—	New Bedford . . . . .	5	—
Boston . . . . .	4	—	Newburyport . . . . .	2	—
Cambridge . . . . .	3	—	North Andover . . . . .	2	—
E. Bridgewater . . . . .	1	—	Peabody . . . . .	1	—
Fall River . . . . .	3	—	Pittsfield . . . . .	44	—
Greenfield . . . . .	1	—	Plymouth . . . . .	1	—
Lawrence . . . . .	1	1	Quincy . . . . .	2	—
Saugus . . . . .	1	—	Randolph . . . . .	1	—
Somerville . . . . .	1	—	Reading . . . . .	2	—
Waltham . . . . .	2	—	Revere . . . . .	3	—
Whitman . . . . .	1	—	Somerset . . . . .	1	—
Worcester . . . . .	1	—	Somerville . . . . .	63	—
551 cases of <i>tuberculosis hilum</i> :			Springfield . . . . .	80	—
Acushnet . . . . .	11	—	Wakefield . . . . .	2	—
Adams . . . . .	12	—	Walpole . . . . .	3	—
Agawam . . . . .	6	—	Waltham . . . . .	2	—
Arlington . . . . .	24	—	Watertown . . . . .	2	—
Attleborough . . . . .	1	—	Webster . . . . .	1	—
Barre . . . . .	1	—	Wellesley . . . . .	1	—
Beverly . . . . .	1	—	Westborough . . . . .	1	—
Boston . . . . .	73	—	Worcester . . . . .	5	—
Brockton . . . . .	4	—	1 case of <i>typhus fever</i> :		
Brookline . . . . .	2	—	Boston . . . . .	1	—
Cambridge . . . . .	13	—	6 cases of <i>undulant fever</i> :		
Chelsea . . . . .	1	—	Ayer . . . . .	1	—
Chester . . . . .	2	—	Boston . . . . .	1	—
Chicopee . . . . .	36	—	Colrain . . . . .	2	—
			Marlborough . . . . .	2	—

<sup>1</sup> Imported cases.<sup>2</sup> Therapeutic cases.<sup>3</sup> Diagnosis not confirmed by laboratory examinations.

## MASSACHUSETTS STATISTICS FOR 1930

Population (U. S. Census population as of April 1, 1930) . . . . .	4,249,614
Death rate per 1,000 population . . . . .	11.6
Infant mortality (per 1,000 live births) . . . . .	60.3

## REPORT OF DIVISION OF FOOD AND DRUGS

HERMANN C. LYTHER, *Director*

The Division of Food and Drugs has been engaged during the year 1930 in the usual routine work of the enforcement of the milk, food and drug, slaughtering, cold storage, bakery, soft drink, and mattress laws. In addition, the Division has examined samples of liquor, narcotics, drugs, and chemicals submitted by the Police Departments.

There were prosecuted 278 cases, of which 247 resulted in conviction; 22 were found not guilty; 6 were placed on file by the Court without plea; and 3 were dismissed for want of prosecution. A complete report of these cases will be found in Table I. The results are summarized as follows:

<i>Sale of low standard vinegar</i>	18 convictions 1 case dismissed 1 case found not guilty.
<i>Sale of milk from which a portion of the cream was removed</i>	12 convictions 1 case found not guilty.
<i>Sale of milk containing added water</i>	25 convictions 2 cases found not guilty.
<i>Representing as certified milk, milk which was not certified</i>	1 case found not guilty.
<i>Selling milk without a license</i>	1 conviction. (This case was prosecuted at the request of the local authorities.)
<i>Representing improperly pasteurized milk as pasteurized</i>	10 convictions 2 cases found not guilty. 4 cases placed on file without finding.
<i>Violation of regulations relating to pasteurized milk</i>	23 convictions 1 finding of not guilty 2 cases placed on file without finding 2 cases dismissed for want of prosecution.
<i>Sale of adulterated or misbranded food</i>	60 convictions 4 findings of not guilty.
<i>Violation of the false advertising law as relating to foods or drugs</i>	16 convictions 1 finding of not guilty.
<i>Sale of adulterated drugs</i>	2 convictions.
<i>Illegal sale of cold storage eggs</i>	65 convictions.
<i>Violation of the slaughtering laws</i>	9 convictions 5 cases found not guilty.
<i>Violation of the mattress laws</i>	4 convictions 4 cases found not guilty.
<i>Obstruction of an inspector</i>	2 convictions.

The inspectors collected 6,636 samples of milk with an average total solids of 12.33% and an average fat of 3.70%. Of these samples 6,370 were apparently free from adulteration and had an average total solids of 12.40% and an average fat of 3.73%.

There were in all 6,880 samples of milk examined, representing in addition to the milk collected by the inspectors certain samples submitted by local inspectors, samples of certified milk submitted by the Medical Milk Commissions, and samples

of milk submitted by the general public. Of these samples, 165 were shown to contain added water; 102 were sold as whole milk and were more or less skimmed, and 4 samples were skimmed milk sold as such.

The samples collected by the inspectors are more liable to show a higher percentage of low standard milk than are the samples sold to the public because the inspector will take many samples representing individual dairies selling milk to a milk dealer, many of which dairies are supplying the milk dealer with low standard milk, whereas the milk dealer will mix the milk of all these dairies together, and the resulting milk which he sells will be above the legal standard. It frequently happens that while the milk which a milk dealer is selling may be above the standard, we may be suspicious that some of the dairies are furnishing milk containing added water, and therefore samples of each dairy are collected in order to ascertain which dairies may be selling the watered milk and a further collection is then made of the milk from each container delivered to the milk dealer by the suspected producer. Of the total samples collected 86.8% were above the legal standard; 80% were above 11.6% in total solids; and if the skimmed and watered samples are excluded, 84% of these samples were above 11.6% in total solids. There is no doubt that more than 90% of the milk sold at retail in this state conforms to the legal requirements as to percentage of solids and fat.

Tables 2 and 3 contain the usual statistical summary of the analyses of milk samples collected by the inspectors during 1930.

#### CREAM

There was recently passed by the Legislature a law relating to the grading of cream. This law provides in substance that cream shall be graded and the package shall be labeled with the grade of cream; otherwise the cream must be labeled "Ungraded Cream." If the container is labeled "Cream," it must bear upon the label a statement of the fat content thereof. The standard for light cream is 16% fat; for medium cream 23% fat; for heavy cream 34% fat; and for extra-heavy cream 38% fat.

The inspectors collected 169 samples of cream of which 35 were found not to conform with the grading specifications or were sold without being labeled as to grade and not containing the percentage of fat upon the label.

There seemed to be no particular attempt on the part of the cream dealers to substitute an inferior cream in any of the grades. The light cream, of which 12 samples were collected, was found to vary between 18% and 29% fat, with an average fat content of 21%, which is almost the equivalent of the 23% standard for the medium cream. The ten samples of medium cream were found to vary between 25% and 50% fat, with an average fat of 34.2%, which is just about the standard for heavy cream. There were 89 samples of heavy cream collected of which 2 were below the standard, both containing 33% fat, the standard being 34%. The other samples varied from 34% to 45% fat, with an average fat of 38.3%. Fifty-four and five-tenths percent of these samples of heavy cream exceeded the standard for extra-heavy cream. The extra-heavy cream samples, 24 in number, varied in fat content between 34% and 45%, 4 of the samples being below the standard of 38%. The average fat content of these samples was 39.6%, which is not sufficiently above the average fat standard for medium cream to warrant the consumer paying any additional price for the extra-heavy cream.

There were 34 samples either labeled "Cream" or in a few instances "Ungraded Cream" which varied in fat content between 27% and 50%, with an average fat content of 38.9%. The bulk of these samples were intended to be sold under the "Heavy Cream" designation and for practical purposes only 3 of these samples were below the heavy cream standard. In these particular cases there was apparently no desire on the part of the cream dealers to deceive the public in the character of the cream which they were selling.

It was, however, found impracticable by sending letters to the boards of health to get the milk dealers to properly grade the cream. A few hearings were held and the matter was then taken up by conference with the Massachusetts Department of Agriculture. As a result of this conference, the Department of Agriculture sent letters to the Dairy Industry, stating that unless the cream was properly labeled as required by the Cream Grading Law, the State Health Department would probably



begin prosecution. This procedure was a wise move on the part of the Department of Agriculture as it relieves them of proceeding against the milk dealers for non-compliance with the law which that Department was instrumental in obtaining enacted and furthermore it gives that Department an opportunity for a quasi criticism of the State Department of Health. The result of these letters was highly satisfactory and it was not necessary for this Department to bring criminal proceedings against dealers for failing to grade the cream.

#### BACTERIOLOGICAL EXAMINATIONS OF MILK

There were 1,695 samples examined bacteriologically, of which 1,327 samples represented raw milk intended to be pasteurized; 209 samples represented pasteurized milk intended for sale; 93 samples represented certified milk; 36 samples represented Grade A milk; and 30 samples represented raw milk to be sold as such. Considering the milk intended to be pasteurized, the bacterial figures are on the whole fairly gratifying. About half the samples were of the quality required for a prepasteurization count for Grade A milk. Slightly less than a third of the samples were above the prepasteurization count set by this Department. Unfortunately, the bulk of this high count milk was Massachusetts milk produced in the neighborhood of the pasteurization establishments.

Our experience with raw whole milk intended for pasteurization indicates that in general the material is of lower count than the upper limit set by this Department for prepasteurized milk. The lowest count in this raw milk intended to be pasteurized was 3,200; the highest count was 15,000,000.

About a year and a half ago, when it was discovered that milk coming from a certain territory and going to a certain pasteurization plant in Massachusetts was running exceptionally high in bacteria, the Department of Agriculture requested the Department of Health to withhold action in order to ascertain whether or not this high count in milk could be corrected by cooperative means. After a little more than a year's work, the representative of the Department of Agriculture notified this Department that their efforts resulted in failure. We found that during October and November, the milk going to this pasteurization plant was of low bacterial count. Just what it will be when the warm weather of June, July, and August next appears is a matter of conjecture.

Of the Grade A samples, only 7 showed counts above 25,000; and 29 showed counts below 25,000. The highest count was 82,000.

Of the 209 samples of pasteurized milk examined, 168 samples showed a count of less than 100,000; and 154 samples showed a count of less than 50,000. The lowest count was 100; the highest count was 3,200,000, which was unusual. Practically all these high count pasteurized milk samples came from pasteurization plants where violations of the law occurred and in practically all instances the proprietors were prosecuted.

Of the 34 samples examined of raw milk to be sold as such, 11 samples showed less than 50,000 count; 23 samples showed less than 300,000 count; and 7 samples showed more than 300,000 count. The lowest count was 4,400; the highest count was 1,800,000.

A summary of the bacterial counts of milk will be found in Table 4.

#### FOODS OTHER THAN MILK AND MILK PRODUCTS

A summary of the statistics will be found in Table 5, representing 1,723 samples, of which 400 samples did not conform with the requirements of the law. There were 8 samples of butter found not to conform with the requirements of the law, — either low fat, or the samples were oleomargarine. The bulk of these oleomargarine samples were examined for the Massachusetts Department of Agriculture. There were 8 samples of cider containing sodium benzoate without the package being labeled as required by regulation. There were 12 samples of clams containing added water. There were 3 samples of dried fruit examined, all of which contained sulphur dioxide, which were sold by the retailer without marking the package as required by regulation. Two samples of egg noodles were examined and were found to be adulterated in that they did not contain the necessary amount of eggs and furthermore were artificially colored. There were 496 samples of eggs examined, of which 203 were found to be either adulterated or misbranded or falsely advertised.



The prevailing violation in the egg game is to sell an old egg under the fresh egg designation. The old egg may have acquired its age in a cold storage warehouse or it may have acquired its age in what we could call a hot storage warehouse, that is, a warehouse kept at a temperature about 45° F. The price of eggs fluctuates from day to day, depending upon the supply of eggs and the demand. The big production time is in the spring. The consumption begins to exceed the production in the fall and winter. When the production begins to exceed the demand the prices begin to drop quite rapidly and every person in the egg business will rush the eggs to market as soon as possible. The farmer, for instance, will not hold them on his premises, knowing full well that if he does he will get less money than if he sells them as soon as received. The same applies to the broker, the wholesaler, and also the dealer. As soon as the price of eggs begins to rise every person in the chain from the producer and retailer begins to hold back on deliveries, and a week of such holding on the part of each such person will result in the age of a month or more to the egg when it reaches the consumer. The retail dealer naturally sells this article as a fresh egg whenever possible, chiefly because of the prejudice which he himself has created against the cold storage egg.

As an egg grows old it loses moisture, which causes a shrinkage of the contents of the shell and consequently an enlargement of the air cell at one end of the egg. If the egg has been kept under refrigeration there is a slow chemical decomposition of the egg during this period of evaporation. If the egg is not kept under refrigeration the chemical decomposition proceeds at a faster rate than it does in the cold storage egg. The fresh egg is characterized by a small air cell, together with a low ammonia content. The cold storage egg is characterized by a large air cell and a comparatively larger ammonia content. The old egg not kept under refrigeration is characterized by a large air cell together with a very large ammonia content.

In one case involving the sale of eggs as "fresh western," the person who purchased the eggs purchased them "as is," subject to his own candling, and the wholesaler who made the sale was directed to keep the eggs in his cold storage warehouse and deliver them on demand. The eggs which the Department official obtained had been kept under such cold storage conditions for a period of three weeks and the retail dealer sold the eggs under the "fresh western" designation.

Some years ago, the Division investigated the ammonia content of fresh eggs, including eggs which we knew were kept under commercial conditions for a period of one month, including transportation to Chicago and return. It was felt that during this period the egg could travel through ordinary mercantile channels and would still be considered by the public to be a fresh egg. It was found that the ammonia content of these eggs varied from slightly less than 1 mg. of ammonia per 100 grams of egg up to 2 mgs. of ammonia.

One hundred and nineteen samples designated as fresh eggs at the time of sale were examined this year. The ammonia content varied from 1.3 up to 3.5 mg. per 100 grams of egg. These figures plotted on arithmetic probability paper fall into two probability series, — one series being above and the other slightly below 2 mgs. of ammonia per 100 grams of egg. The lower series, representing 51.2% of the total eggs were in fact fresh eggs and were sold to the public by the merchants without deceiving their customers. The others were not fresh eggs and corresponded very closely with the eggs sold as or afterwards ascertained to have been cold storage eggs.

Of the cold storage eggs there were 204 samples, 7 of which had an ammonia content of 2 mgs. or less per 100 grams of egg. This represents 3.4% of the entire samples. The highest ammonia content of these cold storage eggs was 3.9 mgs. The median roughly approximates the average of 2.7 mg. of ammonia per 100 grams

It is of course of advantage to the dealer to make his customer believe that he is buying fresh eggs even if the dealer does not always charge the full fresh egg price for these articles. The statistics which the Department has gathered this year are similar to those gathered in previous years and indicate that if the general public buys the low priced alleged fresh egg between October and February the chances are about fifty-fifty that he will get cold storage eggs or if the eggs are not cold stored they are inferior to cold storage eggs.

There is but one way to stop this reprehensible practice, — if the public desires cheap and wholesome eggs during the fall and early winter months, the public should buy the cold stored variety.

Of the 37 samples of flavoring extracts examined, one sample of ginger extract, 2 samples of lemon extract, and 2 samples of vanilla extract were found to be either adulterated or misbranded. There were 14 samples of maple syrup examined, of which 7 proved to be adulterated. Most of this was syrup served in restaurants under the designation of "Maple Syrup" as per the bill of fare or as per signs posted in the restaurant. In each case the proprietor of the restaurant was well aware of the fact that he was violating the law in so doing.

There were 689 samples of meat products examined during the year, of which 19 samples of Hamburg steak and 71 samples of sausages were adulterated. Apart from the presence of decomposed meat, the violations in the case of sausages were largely the introduction of extra cereal content and the addition of color. The principal adulteration in the Hamburg steak, and to a less extent in the sausages, was the addition of sodium sulphite without causing the package to be labeled as required by the regulations of this Department.

In accordance with the provisions of the law, this Department must adopt the regulations of the U. S. Department of Agriculture, provided that such regulations are not inconsistent with the provisions of the Act. The U. S. Department of Agriculture has by regulation provided that the presence of sulphur dioxide in food must be stated upon the label of each package sold. The Department of Agriculture also has another regulation relative to the use of this material in meats. This regulation is in such form that it cannot be adopted by the Department as it provides that the meat inspection stamp shall be placed in the case of meat products only upon those containing no preservative except certain specifically mentioned preservatives, and the sulphite preservatives are not included in this list.

Sodium sulphite can hardly be considered in the same light as the other food preservatives because of its action as a deodorizer, and, to a considerable extent, it acts as an anti-oxidant. The U. S. Department of Agriculture through the Referee Board of Consulting Scientific Experts carefully investigated the sulphur dioxide question, and the results were indeterminate, — that is, it could not be proven beyond a reasonable doubt that the use of sulphur dioxide preservatives were not injurious to health, and at the same time it could not be proven beyond a reasonable doubt that the use of sulphur dioxide preservatives were injurious to health. Under these existing conditions, the only way to stop the use of this preservative would be by prohibitive legislation.

The amount of this material actually used is less than in former years. Fifty-nine samples of Hamburg steak and sausage containing sodium sulphite and collected during the past year were found to vary in sodium sulphite content from 0.5% up to 1.14%. Nearly 9% of these samples contained more than 0.5% of sodium sulphite, 20% contained from 0.25% to 0.5%, 47% contained from 0.1% to 0.25%, and 24% contained less than 0.1%. The arithmetic mean of these figures was 0.23%; the geometric mean 0.16%; and the median 0.15%.

There were 5 samples of olive oil examined, of which 1 was found to be adulterated.

Eighteen samples of soft drinks were collected, of which 12 were reported as adulterated. Most of these 12 samples were misbranded samples. In addition there are included the results of the examination of bottles intended to hold soft drinks, the bottles being taken from the case as they were about to be filled. They were exceptionally high in bacterial content, showing improper sterilization of the bottles.

Fifty-six samples of vinegar were examined, and three were found not to conform to the standard requirements.

#### APPLES

During the present year there was an unprecedented drought in Massachusetts and it was feared that as a result apples marketed from Massachusetts orchards would contain a dangerous amount of arsenic. As a rule the apple grower in Massachusetts can depend upon August, September, and October rains to remove any excess spray residue from apples in his orchard. In the western states, conditions are somewhat different, and because of the absence of rain during the ripening



season, the bulk of the apples are heavily infested with arsenic. Such apples, before they can be shipped in interstate commerce, without being considered adulterated under the U. S. Food and Drugs Act, are required to be dipped in dilute hydrochloric acid so as to remove the spray residue from the fruit.

There is an international limit of not more than 0.01 grain of arsenic per pound of apples. The Secretary of Agriculture has set a tentative interstate limit of 0.015 grain of arsenic per pound. Information obtained from the U. S. Department of Agriculture led us to believe that there was practically no danger of excessive spray residue being found on Massachusetts apples. Twenty-six samples were obtained, however, most of them from storage warehouses, representative of the 1930 apple crop of Massachusetts. Some of these samples were obtained in the eastern part of this county and others in the western. These samples consisted of from six to ten apples each, carefully selected from the bin or barrel, as the case may be, and they were carefully examined in the laboratory. Four samples were found to contain no arsenic at all; 6 samples contained arsenic less than .0001 grain per pound; 3 samples contained between .0001 and .0008; 11 samples contained between .0011 and .0096; only 2 samples contained arsenic above the international limit, but these were below the interstate limit and the arsenic content was .0112 and .0126 grain per pound. These figures confirmed the information obtained from U. S. Department of Agriculture that there was little to fear from the small content of spray residue on the Massachusetts apples.

A number of samples of sweet cider were also examined and with but one exception were found to contain either no arsenic or a mere trace of arsenic. One sample contained 1.4 milligrams of arsenic per liter; another sample contained 0.2 of a milligram per liter; 3 contained 0.04 milligram per liter; 4 samples contained smaller quantities; and 8 contained no arsenic at all.

There were collected and examined in all 32 samples of cider, of which 8 contained benzoic acid as a preservative without bearing the label required by statute. Two of these samples also represented a mixture of sugar, water, cider, and benzoic acid, sold with a sweet cider label. This case resulted in a prosecution.

#### BACTERIOLOGICAL EXAMINATION OF SHELLFISH

There were 376 samples of shellfish examined bacteriologically, of which 133, or 35.4%, showed evidence of sewage pollution. These samples consisted of 201 samples of clams; 147 samples of soft shell clams; 24 samples of quahogs; and 4 samples of mussels.

A summary of the bacteriological count of these samples is shown in Table 6.

It was found necessary to prosecute a number of persons for the sale of polluted shellfish. In every case prosecuted there was positive evidence submitted to show that the shellfish was obtained from areas approved by the State Health Department or the shellfish was obtained from persons having certificates from the Department, such certificates showing that the areas where these persons intended to collect shellfish were free from pollution, or from persons having certificates from the appropriate Department of other cities, which certificates were approved by the U. S. Public Health Service.

The certification plan as applied to shellfish was presumably put into effect with the altruistic idea that it would be of benefit to the public. "It merely acts as a defense in favor of the person who deliberately takes shellfish from areas which he knows to be polluted, and sells the same to the public as coming from areas specified in the certificate which he has legally secured either from this or other Departments. It seems almost impossible to stop the sale of such shellfish by those methods which up to now have been employed, which methods have been to proceed against the person who takes shellfish from contaminated areas. It maybe advisable to change our practice and proceed against the retail dealer who sells such shellfish to the public.

We have found considerable shellfish shipped in from Maine, which has been found to be polluted. Efforts to get the U. S. Public Health Service to proceed against the persons selling such shellfish have been fruitless. The shipments are interstate and should be controlled by the U. S. authorities, but the U. S. authorities are at present permitting such persons to ship such shellfish into Massachusetts under a certificate approved by the U. S. Public Health Service. A number of

cases have been secured, and it will probably be necessary for this Department to refer these cases to the United States Attorney for prosecution in the United States Courts.

#### LIQUOR SAMPLES

The Police Departments submitted 6,346 samples. The results of the examination of these will be found in Table 7.

There were 133 liquor samples classified as miscellaneous. These are summarized as follows:—

Completely denatured alcohol . . . . .	20	samples
Specially denatured alcohol . . . . .	6	"
Liquor mixed with sylpho nathol . . . . .	36	"
Bay rum . . . . .	28	"
Perfumery other than bay rum . . . . .	2	"
Flavoring extracts, etc. . . . .	22	"
Anise . . . . .	18	
Camphor . . . . .	1	
Ginger . . . . .	1	
Lemon . . . . .	1	
Wintergreen . . . . .	1	
Lacquer solvents . . . . .	7	"
Amyl acetate, ethyl acetate and benzol . . . . .	1	
Methyl alcohol and amyl acetate . . . . .	1	
Fusel oil mixture . . . . .	1	
Iso prophy alcohol mixture . . . . .	4	
Kerosene . . . . .	1	"
Coffee . . . . .	1	"
Soap . . . . .	1	"
Glycerine . . . . .	1	"
Ginger ale . . . . .	1	"
Proprietary drugs . . . . .	1	"
Liquor containing methyl alcohol, the highest concentration of which being 0.95% . . . . .	6	"

In connection with the paralysis cases caused by Jamaica Ginger, a number of samples of Jamaica Ginger were submitted, but in no instance was there a sample submitted upon which a sale was made and upon which a case could be brought under the food and drug law, provided the material did not conform to the requirements of the Pharmacopoeia. These samples were examined chemically and were found in many instances not to contain the amount of ginger solids required for a U. S. P. Fluid Extract of Ginger. Several samples were submitted to Dr. Reid Hunt for pharmacological examination, and he was unable to ascertain that any of the samples would cause the paralysis complained of. In connection with this work, samples were examined for various chemicals, which physicians stated might be responsible for the paralysis, and in no case were such chemicals found. Examinations were also made of a number of samples of urine obtained from the persons having the paralysis.

A telephone communication was received from a person who stated that he was a reporter on a Worcester newspaper. He stated that there were sales being made throughout the city, "most everywhere," of ginger extracts causing paralysis. An inspector was sent to the newspaper and the newspaper was unable to furnish any evidence as to locations where this material could be purchased. The inspector and his companion were unable to purchase any Jamaica Ginger Extract in the City of Worcester. In one instance they inquired of a man, who looked as if he were of the type who consumed such material, as to where such could be purchased. The man declined to tell except in one instance of a person who had at one time "short-changed" him. The inspector went to this store and his companion stayed outside. The inspector had nearly completed negotiations for the purchase of some Ginger when a police officer hove in sight, and three children playing outside in the street came into the store and informed the storekeeper of the fact that a policeman was on his way, and negotiations were all off.

It was apparent from our investigation of the Jamaica Ginger situation that practically all of this Ginger was sold through illegal liquor channels and it was not handled by reputable merchants. This work was done prior to the discovery that cresolphosphate was the cause of the paralysis.



### DRUGS

There were 143 samples of drugs examined, of which 42 did not conform to the requirements of the Pharmacopoeia. These were as follows:

- 1 sample of camphorated oil of low strength.
- 4 samples of ether containing aldehydes or peroxides or both.
- 3 samples of lime water deficient in lime.
- 1 sample of magnesium citrate solution was a solution of magnesium sulphate.
- 2 prescriptions did not conform to the specifications.
- 2 proprietary medicines were misbranded.
- 29 samples of spirit of nitrous ether were found to be of low strength.

(Most of this low strength nitrous ether was obtained during the month of November, and cases involving this will not be disposed of until the next fiscal year.)

The four samples of ether were obtained at the request of the U. S. Department of Agriculture regarding samples upon which the proof of interstate shipment had been lost. The ether was all shipped back to the manufacturers and would not be put out again as anaesthetic ether but would be diverted to commercial purposes.

A summary of the drug statistics will be found in Table 8.

### BAKERY INSPECTION

The local boards of health reported 3,771 inspections of bakeries during the year. They gave 411 verbal warnings and 340 written warnings. There were 18 hearings given; 5 bakeries were closed; and in 3 instances medical examinations of employees were made.

The Department inspected 365 bakeries, and notices of defects were sent to the Boards of Health where the bakeries were located, with directions that the Board of Health should see that the bakeries were put in proper shape for compliance with the law. The principal violations discovered were dirty floors, walls and ceilings; stock not properly protected from contamination; products not properly protected; toilets not constructed or operated as per the regulations; a profusion of flies; absence of garbage can; and general unsanitary conditions.

### SLAUGHTERING INSPECTION

The usual routine work in connection with the nominations for the position of slaughtering inspector was carried out. Fortunately, the bulk of the Boards of Health renominated the inspectors and sent in but few new names. Occasionally, a change in town politics resulted in the sending of the name of an incompetent man for the position, and after he was investigated, found to be incompetent, and disapproved, the Board of Health sent in the name of the former inspector who was approved if no evidence had been secured indicating that his work had been improper.

The principal violation of the slaughtering laws consists of slaughtering in the absence of the inspector, and, on the part of the inspector, in putting the official stamp on carcasses which he had not seen slaughtered. Obtaining evidence of either of these violations results in prosecution in the case of the butcher, and in prosecution or removal in the case of the inspector.

One case deserves special comment. A complaint was received that an animal which had died of arsenic poison by eating under trees which had been recently sprayed, was taken to a slaughterhouse and the carcass used for food purposes. The inspector who investigated this case found that there was another animal involved, namely, one that had been killed by an automobile, and some time afterwards the animal had been bled and brought to the slaughterhouse and dressed. The carcass of the animal killed by the automobile was found to have been stamped. The local inspector said that he did not stamp the carcass and it was therefore our opinion that the butcher may have secured from some source the official stamp. The butcher claimed that the carcass of the animal which had died as the result of eating the poisoned foliage had been buried in a manure pile or had been buried somewhere else. We found the head of this carcass in the adjoining city, and the owner of the animal was able to identify it. Incidentally, the owner of the animal had sold the carcass for its rendering value only and presumed that the carcass would be so used.

The butcher was prosecuted for having in his slaughterhouse an animal which had died a natural death. He was prosecuted for slaughtering in the absence of the inspector. He was prosecuted for obstructing an inspector. In this case, the District Attorney very kindly consented to act as prosecuting officer.

Just as the case was going to trial, the local inspector stated that he did stamp the carcass of the animal which had been killed by an automobile, and his first statement that he did not stamp the carcass was not correct. This resulted in dismissing the case relative to slaughtering in the absence of the inspector. The Judge dismissed the case against the butcher for having in his slaughterhouse an animal which had died other than by slaughter, but the butcher was convicted of obstructing an inspector by concealing a carcass. Subsequently, the Department removed the local inspector from office.

The inspectors have reported that the local slaughtering inspection as now carried out in Massachusetts is upon a much higher plane than was the case when the work was first turned over to the Department in 1911. It is fairly well understood among the butchers that the State Health Department proposes that the slaughtering inspection shall be carried on in a proper manner, and that the people will receive the protection which the "Massachusetts Inspected and Passed" stamp implies that they should receive.

Table 9 gives a summary of the inspections made by the local inspectors of slaughtering, together with the number of carcasses confiscated and the reasons for confiscation.

#### COLD STORAGE

The inspector assigned to cold storage warehouses has been engaged in the usual duties of seeing that the warehouses are kept in a sanitary condition and that they otherwise comply with the law. There has been the usual number of requests for extension of time on goods in storage.

A summary of these requests and our action thereon will be found in tables 10 and 11. Table 12 gives a list of lots that had been in storage beyond the statutory time limit of one year, upon which no request for extension had been made, and which were ordered removed from storage. These lots were all in good condition and were fit for food purposes. In all cases the extensions were granted because the articles were in proper shape for further storage.

Some of the wholesale meat dealers had imported large quantities of Argentine meat with the intention of selling the same at a profit. After extensions were granted up to the limit in one instance, this material was sold for sausage meat at a loss of approximately forty thousand dollars. Lots of frozen eggs in storage, the eggs being intended for use by bakers, will no doubt come out of storage showing a considerable loss to the owners. The same will probably be true to some extent in the case of surplus fish.

The only violation of the cold storage law which it was necessary to refer to the courts related to the illegal sale of cold storage eggs.

Tables 13 and 14 give a summary of the reports of the cold storage warehouses to the Department.

#### INVESTIGATION OF THE MANUFACTURE AND SALE OF MATTRESSES

A case involving the mattress law was carried to the Supreme Court. The agreed statement of fact was not exactly in conformance with the actual facts, but both the Department and the Mattress Dealers Association desired an opinion upon the law. The law defines "previously used" as any material which has been used as a part or portion of another manufactured article, or used for any other purpose. The law requires such material to be labeled "Second-hand." The particular case involved the use of material which was actually second-hand in the ordinarily accepted meaning of such a term; that is to say, it consisted of rags presumably collected by the rag man, reground, and placed in a mattress bearing the words "All new material." In the agreed statement of facts it was stated that the material used was ground up material obtained from clippings from new cloth which had not been worn. The Supreme Court held that this material had been used before, and consequently the material should have been labeled "Second-hand." As a result of this decision, the Mattress Association have endeavored to get its members to comply strictly with the law as it now stands, and our expe-

rience has shown that practically all these persons are actually complying with the letter of the law.

We were required during the course of the year to make eight prosecutions, most of which were for the use of second-hand material. Four cases tried in Williamstown resulted in a finding of not guilty. The evidence as to violation was substantially the same as that introduced in the other cases.

It was found that certain of the mattress dealers were labeling their mattresses in a manner which might be misunderstood by the purchaser by stating that in accordance with the Massachusetts law they were required to use the word "Second-hand" in connection with the nature of the material. At the request of the Mattress Manufacturers Association, the Department made a change in the regulation, requiring that the "Second-hand" tag be a red tag, this change in the regulation to take effect on January 1, 1931, and it is believed that this will materially improve the mattress situation.

#### MISCELLANEOUS INSPECTION WORK

A certain amount of work has been done in connection with the caustic poison law, and it was found that in general vendors of these articles intended for household purposes are complying with the law by affixing the "Poison" label. In one instance, a bottle of ammonia was found to be unlabeled. The matter was taken up with the wholesaler and the law was subsequently complied with.

The Department investigated the use of cyanide as a metal polish in hotels, but in no case was any evidence gathered to show that such material was being so used.

In connection with the usual routine work, the inspectors made many confiscations in storage warehouses, in slaughterhouses, and in retail markets. A summary of these confiscations is found in Table 15.

TABLE 1. — *For Sale of Milk not of Good Standard Quality*

NAME	Address	Court	Date	Result
Alves, Joseph P.	Fall River	Fall River	Sept. 23, 1930	Dismissed*
Bellerose, Edmund	Southbridge	Southbridge	Jan. 31, 1930	Conviction
Brockelman Brothers, Inc.	Worcester	Worcester	Feb. 14, 1930	Conviction
Caras, Alexander	Taunton	Taunton	Dec. 12, 1929	Conviction
Coronella, Salvatore	Arlington	Cambridge	Nov. 4, 1930	Conviction
Counoyer, H.	Southbridge	Southbridge	Jan. 31, 1930	Conviction
Dakos, Mathias	Peabody	Peabody	Apr. 14, 1930	Conviction
Dundulis, John	Norwood	Dedham	Dec. 29, 1929	Conviction
Grout, Francis	Sherborn	Natick	Apr. 5, 1930	Conviction
Hanley's Candy Store, Inc.	Cambridge	Cambridge	Mar. 31, 1930	Conviction
Hood & Sons Inc., H. P.	Lawrence	Andover	Aug. 21, 1930	Conviction
Ingalls, Milo	Dracut	Lowell	May 5, 1930	Conviction
Kalkow, Damon	Newburyport	Newburyport	Sept. 2, 1930	Conviction
Moody, Arthur W.	Newbury	Newburyport	Apr. 22, 1930	Discharged
Moriarty, Florence J.	Lowell	Lowell	Dec. 16, 1929	Conviction
Murphy, Timothy	Milford	Milford	July 14, 1930	Conviction
Murphy, Timothy	Milford	Milford	July 14, 1930	Conviction
Photos, Theodore	Salem	Salem	Mar. 4, 1930	Conviction
Sughrue, James J.	Whitinsville	Blackstone	Dec. 27, 1929	Conviction
Welch, Thomas J.	Newburyport	Newburyport	Apr. 22, 1930	Conviction

#### *For Sale of Milk from which a Portion of the Cream had been removed*

Di Pietro, Carmine	Stow	Concord	Oct. 6, 1930	Conviction
Finkelstine, Fannie	Millis	Franklin	Oct. 30, 1930	Conviction
Friend, Lemuel	Gloucester	Gloucester	Oct. 20, 1930	Conviction <sup>1</sup>
Gavin, Thomas J.	Sherborn	Framingham	Oct. 27, 1930	Conviction <sup>2</sup>
Hudson, Norman H.	Wareham	Wareham	Sept. 13, 1929	Conviction
Kapatoes, Michael	Milford	Milford	June 9, 1930	Conviction
Leconte, Octave	Acushnet	New Bedford	Oct. 31, 1930	Discharged
McCarrier, Thomas	Saugus	Saugus	Mar. 22, 1930	Conviction
Novick, Samuel	Millis	Franklin	Oct. 30, 1930	Conviction
Packard, Ralph	Northampton	Northampton	Jan. 3, 1930	Conviction
Reposa, Manuel	Fairhaven	New Bedford	Oct. 31, 1930	Conviction <sup>3</sup>
Rodrigue, Antonio	Wilbraham	Palmer	July 11, 1930	Conviction
Samuel, Herman	Easthampton	Northampton	May 1, 1930	Conviction

\*Due to death of Inspector.

<sup>1</sup> Appealed.

<sup>2</sup> Continued to January 31st, 1931, for disposition.

<sup>3</sup> Appealed to Supreme Court; pending.



*For Sale of Milk Containing Added Water*

NAME	Address	Court	Date	Result
Andre, John . . . . .	Springfield . . . . .	Springfield . . . . .	July 17, 1930	Conviction <sup>1</sup>
Arruda, Joseph . . . . .	Tiverton, R. I. . . . .	Fall River . . . . .	Feb. 18, 1930	Conviction
Borkowsky, William . . . . .	West Springfield . . . . .	Springfield . . . . .	July 29, 1930	Conviction
Boucher, Octave . . . . .	Easthampton . . . . .	Northampton . . . . .	May 1, 1930	Conviction <sup>2</sup>
Bury, Charles . . . . .	Taunton . . . . .	Taunton . . . . .	Dec. 12, 1929	Conviction
Comeau, Leo . . . . .	Essex . . . . .	Gloucester . . . . .	Aug. 28, 1930	Conviction
Dastague, Simon . . . . .	Sudbury . . . . .	Framingham . . . . .	June 27, 1930	Conviction
Delginio, Joseph . . . . .	West Medway . . . . .	Franklin . . . . .	May 10, 1930	Conviction
Gates, Parker . . . . .	Leominster . . . . .	Leominster . . . . .	Mar. 7, 1930	Conviction <sup>2</sup>
George, Louie . . . . .	Sturbridge . . . . .	Southbridge . . . . .	Dec. 23, 1929	Conviction <sup>3</sup>
Guertin, Louis . . . . .	Ware . . . . .	Ware . . . . .	May 16, 1930	Conviction
Hart, Benjamin M. . . . .	Ipswich . . . . .	Ipswich . . . . .	Mar. 27, 1930	Conviction
Heilman, Alfred . . . . .	Templeton . . . . .	Gardner . . . . .	June 13, 1930	Conviction <sup>2</sup>
Henrichon, George . . . . .	Brimfield . . . . .	East Brookfield . . . . .	Apr. 29, 1930	Conviction
Kapinos, Walter . . . . .	West Springfield . . . . .	Springfield . . . . .	July 9, 1930	Conviction
Mederios, John . . . . .	Somerset . . . . .	Fall River . . . . .	Aug. 8, 1930	Conviction
Mellon, Harry . . . . .	Edgartown . . . . .	Edgartown . . . . .	Nov. 29, 1930	Discharged
Motta, Jesse . . . . .	Plympton . . . . .	Plymouth . . . . .	Aug. 1, 1930	Conviction
Noyes, Elbridge . . . . .	Newbury . . . . .	Newburyport . . . . .	Apr. 8, 1930	Discharged
Packard, Ralph . . . . .	Northampton . . . . .	Northampton . . . . .	Jan. 3, 1930	Conviction
Pierce, Sarah A. . . . .	Acushnet . . . . .	New Bedford . . . . .	Nov. 7, 1930	Conviction <sup>2</sup>
Pilch, Joseph . . . . .	Ware . . . . .	Ware . . . . .	May 16, 1930	Conviction
Ray, Patrick . . . . .	Haverhill . . . . .	Haverhill . . . . .	July 1, 1930	Discharged
Schultz, John . . . . .	Salem, N. H. . . . .	Methuen . . . . .	Apr. 18, 1930	Conviction
Sperounis, Charles . . . . .	Dracut . . . . .	Lowell . . . . .	Aug. 18, 1930	Conviction
Sylvester, Leonard W. . . . .	Acton . . . . .	Concord . . . . .	Oct. 24, 1930	Conviction
Terzian, Samuel . . . . .	Whitman . . . . .	Abington . . . . .	May 24, 1930	Conviction <sup>2</sup>

*For Violation of Regulations Regarding Sale of Certified Milk*

Economy Grocery Stores, Inc.	Somerville . . . . .	Somerville . . . . .	Mar. 6, 1930	Discharged
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*Selling Milk Without a License*

George, Louie . . . . .	Sturbridge . . . . .	Southbridge . . . . .	Dec. 23, 1929	Conviction <sup>3</sup>
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<sup>1</sup> Suspended for sentence for one year.<sup>2</sup> Appealed.<sup>3</sup> Suspended for sentence for two years.*Selling Unpasteurized Milk as Pasteurized*

NAME	Address	Court	Date	Result
Avery, Lester E. . . . .	Plymouth . . . . .	Plymouth . . . . .	June 20, 1930	Conviction
Bassett, Frank H. . . . .	Greenfield . . . . .	Greenfield . . . . .	May 22, 1930	Conviction
Bedard, Joseph . . . . .	Methuen . . . . .	Lawrence . . . . .	Aug. 4, 1930	- <sup>1</sup>
Bissell, Frank J. . . . .	Holyoke . . . . .	Holyoke . . . . .	July 30, 1930	Conviction
Clark, John H. . . . .	Weston . . . . .	Waltham . . . . .	Oct. 31, 1930	Discharged
Davidson & Sons, Jacob . . . . .	Chelsea . . . . .	Chelsea . . . . .	July 31, 1930	Discharged
Fram, Joseph . . . . .	Newburyport . . . . .	Newburyport . . . . .	Jan. 22, 1930	Conviction <sup>2</sup>
Guimond, Amede . . . . .	Lowell . . . . .	Lowell . . . . .	July 9, 1930	Conviction
Konisky, Anthony . . . . .	Millbury . . . . .	Worcester . . . . .	Mar. 14, 1930	Conviction
Law, Arthur E. . . . .	Methuen . . . . .	Lawrence . . . . .	Aug. 4, 1930	- <sup>1</sup>
Noel, Felix . . . . .	Granby . . . . .	Northampton . . . . .	July 25, 1930	Conviction
Pratt, John W. . . . .	Peabody . . . . .	Peabody . . . . .	July 2, 1930	Conviction
Rodden, Hugh . . . . .	Salem . . . . .	Salem . . . . .	Oct. 21, 1930	Conviction <sup>2</sup>
Rogers & Son, Andrew . . . . .	Methuen . . . . .	Lawrence . . . . .	Aug. 4, 1930	- <sup>1</sup>
Vollert, Freda H. . . . .	Holyoke . . . . .	Holyoke . . . . .	July 18, 1930	Conviction
Webster, Frank W. . . . .	Methuen . . . . .	Lawrence . . . . .	Aug. 4, 1930	- <sup>1</sup>

*For Violation of Pasteurization Law and Regulations*

Alves, Joseph P. . . . .	Fall River . . . . .	Fall River . . . . .	Sept. 23, 1930	Conviction
Avery, Lester E. . . . .	Plymouth . . . . .	Plymouth . . . . .	June 20, 1930	Conviction
Bissell, Frank J. . . . .	Holyoke . . . . .	Holyoke . . . . .	July 30, 1930	Conviction
Boutournes, James . . . . .	Haverhill . . . . .	Haverhill . . . . .	Oct. 2, 1930	Conviction
Cape Ann Dairy, Inc. . . . .	Essex . . . . .	Gloucester . . . . .	Apr. 9, 1930	Conviction
(5 counts)				
Clover Leaf Dairy, Inc. . . . .	Haverhill . . . . .	Haverhill . . . . .	Aug. 1, 1930	Conviction
Crane, James . . . . .	Leominster . . . . .	Leominster . . . . .	Mar. 20, 1930	Conviction
Crane, James . . . . .	Leominster . . . . .	Leominster . . . . .	May 2, 1930	Conviction
Currier, Matthew N. . . . .	Haverhill . . . . .	Haverhill . . . . .	Aug. 1, 1930	Conviction
Dolinski, Henry . . . . .	Saugus . . . . .	Saugus . . . . .	Aug. 23, 1930	Conviction
Emanouil, Stefanos . . . . .	Chelmsford . . . . .	Lowell . . . . .	July 9, 1930	Conviction
Emanouil, Stefanos . . . . .	Chelmsford . . . . .	Lowell . . . . .	Nov. 5, 1930	Conviction
Freeman, Everett . . . . .	Whitman . . . . .	Abington . . . . .	May 20, 1930	Conviction
Law, Arthur E. . . . .	Methuen . . . . .	Lawrence . . . . .	Aug. 4, 1930	- <sup>1</sup>
Magee, Albert T. . . . .	North Leominster . . . . .	Leominster . . . . .	Apr. 10, 1930	Dismissed
Manning, Harriet M. . . . .	Milton . . . . .	Quincy . . . . .	July 25, 1930	Dismissed
Moore, George . . . . .	Weymouth . . . . .	Quincy . . . . .	May 19, 1930	Conviction
Noel, Felix . . . . .	Granby . . . . .	Northampton . . . . .	July 25, 1930	Conviction

<sup>1</sup> On file without finding.<sup>2</sup> Appealed.

*For Violation of Pasteurization Law and Regulations — Concluded*

NAME	Address	Court	Date	Result
Pratt, John W.	Peabody	Peabody	Apr. 14, 1930	Conviction
Pratt, John W.	Peabody	Peabody	July 2, 1930	Discharged
Pratt, John W.	Peabody	Peabody	July 2, 1930	Conviction
Rodden, Hugh	Salem	Salem	Oct. 21, 1930	Conviction <sup>1</sup>
Rogers & Son, Andrew	Methuen	Lawrence	Aug. 4, 1930	- <sup>2</sup>
Rogers, Joseph A.	Haverhill	Haverhill	Aug. 1, 1930	Conviction
Sawyer, Robert	Bradford	Haverhill	Aug. 1, 1930	Conviction
Smith, Joseph B. & Walter C.	Whitman	Abington	May 20, 1930	Conviction
Stoddard, Ashley	Rockland	Abington	June 7, 1930	Conviction
Vollert, Freda H.	Holyoke	Holyoke	July 18, 1930	Conviction

*For Sale of Adulterated or Misbranded Foods Other than Milk and Milk Products*

## APPLE JACK SYRUP

[Contains Benzoate]

Shapiro, Henry	Boston	Boston	Feb. 17, 1930	Conviction
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## CIDER

[Not made from apples]

Shapiro, Henry	Boston	Boston	Feb. 17, 1930	Conviction
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## CLAMS

[Contained added water]

Brockelman Brothers, Inc.	Lowell	Lowell	May 19, 1930	Conviction <sup>1</sup>
Davis, Fred	Lowell	Lowell	May 5, 1930	Conviction

<sup>1</sup> Appealed.<sup>2</sup> On file without finding.

## CLAMS

[Sewage polluted]

NAME	Address	Court	Date	Result
Amerio, Veto	Ipswich	Ipswich	Aug. 12, 1930	Discharged
O'Hara Brothers Company, Inc.	Boston	Newton	May 20, 1930	Discharged
Robertson, Gilbert	Ipswich	Ipswich	Aug. 12, 1930	Conviction
Smart, Albert A.	Lynn	South Boston	Feb. 13, 1930	Conviction
Snow, Fred H.	Pine Point, Me.	South Boston	Feb. 13, 1930	Conviction
Wells, Victor	Winthrop	Boston	Oct. 31, 1930	Conviction

## EGGS

[Misbranded]

Chamberlain & Co., Inc.	Boston	Boston	Oct. 28, 1930	Conviction
Chamberlain & Co., Inc.	Boston	Boston	Oct. 28, 1930	Conviction
Lerner, Benjamin	Worcester	Worcester	Feb. 24, 1930	Conviction
Manhattan Food Stores Company	Somerville	Somerville	Sept. 30, 1930	Conviction
Stevens Company, Genery	Worcester	Worcester	Nov. 26, 1930	Conviction <sup>1</sup>
Wilson & Company	Providence, R. I.	Attleboro	Mar. 6, 1930	Conviction

## EGG NOODLES

[Contained coloring matter]

Stanghellini, Reno	Plymouth	Plymouth	July 11, 1930	Conviction
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## EGG NOODLES

[Egg content below standard]

Stanghellini, Reno	Plymouth	Plymouth	July 11, 1930	Conviction
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<sup>1</sup> Appealed.

## HAMBURG STEAK

[Selling, or offering for sale, meat containing sodium sulphite in violation of the regulations of the Department of Public Health]

NAME	Address	Court	Date	Result
Albert, Victor	Cambridge	Cambridge	Mar. 31, 1930	Conviction
Handler, Lewis	Brookline	Brookline	May 26, 1930	Conviction
Mendick, Mitchell	Worcester	Worcester	Nov. 5, 1930	Conviction
Waltham Provision Company, Inc.	Waltham	Waltham	Dec. 28, 1929	Conviction

## MAPLE SYRUP

[Contained cane sugar]

Boulos, Nicholas	Stoughton	Stoughton	June 16, 1930	Conviction
Ganas, Christy	Webster	Webster	Dec. 17, 1929	Conviction
Sing, Mah	Salem	Salem	Apr. 28, 1930	Conviction

*Diseased Meat*

Budnick, Ezreal	Boxford	Haverhill	Oct. 22, 1930	Discharged
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*For Sale of Adulterated or Misbranded Foods Other than Milk and Milk Products —*  
**Continued**

**SAUSAGE**

[Contained starch in excess of 2 per cent]

Barthel, Eugene . . .	Gardner . . .	Gardner . . .	Dec. 6, 1929	Conviction
Borowick, Michael . . .	Fall River . . .	Fall River . . .	Dec. 10, 1929	Conviction
Brockelman Brothers, Inc. . .	Worcester . . .	Worcester . . .	Feb. 14, 1930	Conviction
Cullen, Alexander . . .	Greenfield . . .	Greenfield . . .	Feb. 21, 1930	Conviction
Dionne, Elzear . . .	Lowell . . .	Lowell . . .	Feb. 3, 1930	Conviction
Fein-Young, Inc. . .	Roxbury . . .	Roxbury . . .	Feb. 10, 1930	Conviction
Kollios, Spiro . . .	Southbridge . . .	Southbridge . . .	Mar. 12, 1930	Conviction
Kuechler Brothers, Inc. . .	New Bedford . . .	New Bedford . . .	Apr. 7, 1930	Conviction
Kulik, John . . .	Lawrence . . .	Lawrence . . .	Mar. 10, 1930	Conviction
Martel, Adelard . . .	Lynn . . .	Salem . . .	Mar. 28, 1930	Conviction
Paradis, Fernand . . .	Holyoke . . .	Holyoke . . .	Feb. 14, 1930	Conviction
Sioufi, Michael . . .	Lawrence . . .	Lawrence . . .	Jan. 27, 1930	Conviction
Smaha, Herbert K. . .	Lawrence . . .	Lawrence . . .	Jan. 13, 1930	Conviction <sup>1</sup>
Weitz, Carl A. . .	Boston . . .	Boston . . .	Jan. 22, 1930	Conviction

**SAUSAGE**

[Contained a compound of sulphur dioxide not properly labeled]

Foss, David . . .	Chicopee . . .	Chicopee . . .	Feb. 6, 1930	Conviction
Janik, Martin . . .	Chicopee . . .	Chicopee . . .	Feb. 6, 1930	Conviction
Lenarcen, Joseph . . .	Holyoke . . .	Holyoke . . .	Feb. 14, 1930	Conviction
Sigda, Stanley . . .	Holyoke . . .	Holyoke . . .	Feb. 14, 1930	Conviction
Solin's Market, Inc. . .	Chicopee . . .	Chicopee . . .	Feb. 6, 1930	Conviction
Suher, Max . . .	Springfield . . .	Springfield . . .	Feb. 6, 1930	Conviction
Trytko, Joseph . . .	Northampton . . .	Northampton . . .	Jan. 10, 1930	Conviction

*For Violation of the Oleomargarine Law*

Castonguay, Wilfred . . .	New Bedford . . .	New Bedford . . .	Feb. 12, 1930	Conviction
Castonguay, Wilfred . . .	New Bedford . . .	New Bedford . . .	Feb. 12, 1930	Conviction
Gaucher, John (2 counts) . . .	New Bedford . . .	New Bedford . . .	Feb. 12, 1930	Conviction

<sup>1</sup>Appealed.*For Sale of Decomposed Food***CHICKEN**

NAME	Address	Count	Date	Result
Zass, Louis . . .	Fall River . . .	Fall River . . .	Mar. 25, 1930	Conviction

**EGGS**

Betty Alden, Inc. . .	Boston . . .	Boston . . .	Feb. 21, 1930	Conviction
Carbone, Joseph . . .	Fitchburg . . .	Fitchburg . . .	Nov. 7, 1930	Conviction
Costanzo, Vincent . . .	Boston . . .	Lynn . . .	Feb. 11, 1930	Conviction <sup>1</sup>
First National Stores, Inc. . .	Newton . . .	Newton . . .	Sept. 29, 1930	Conviction
First National Stores, Inc. . .	Somerville . . .	Somerville . . .	Oct. 20, 1930	Conviction
Friend Brothers, Inc. . .	Lynn . . .	Lynn . . .	Feb. 4, 1930	Discharged
Larivee, Alfred . . .	Fall River . . .	Fall River . . .	Feb. 4, 1930	Conviction
Shore, Samuel . . .	Boston . . .	Lynn . . .	Feb. 15, 1930	Conviction <sup>1</sup>

**HAMBURG STEAK**

L'Heureux, Donat . . .	Salem . . .	Salem . . .	May 14, 1930	Conviction
Rudacevsky, Samuel . . .	Fall River . . .	Fall River . . .	Feb. 18, 1930	Conviction
Zass, Louis . . .	Fall River . . .	Fall River . . .	Mar. 25, 1930	Conviction
Zass, Louis . . .	Fall River . . .	Fall River . . .	Mar. 25, 1930	Conviction

**SAUSAGE**

Goldstein, Samuel . . .	Fall River . . .	Fall River . . .	Feb. 18, 1930	Conviction
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<sup>1</sup>Appealed.*False and Misleading Advertising***EGGS**

[Sale of eggs which were not fresh as fresh eggs]

NAME	Address	Court	Date	Result
Alpert, Morris . . .	Somerville . . .	Somerville . . .	Oct. 22, 1930	Conviction
Brockelman Brothers, Inc. . .	Leominster . . .	Leominster . . .	Feb. 7, 1930	Conviction
Conrad, Lawrence E. . .	Peabody . . .	Peabody . . .	Dec. 11, 1929	Conviction
Denkmejian, Richard . . .	Somerville . . .	Somerville . . .	Sept. 30, 1930	Conviction
First National Stores, Inc. . .	Waltham . . .	Waltham . . .	Dec. 10, 1929	Conviction
First National Stores, Inc. . .	Blackstone . . .	Blackstone . . .	Dec. 27, 1929	Conviction
Goldman, Julius . . .	Worcester . . .	Worcester . . .	Nov. 5, 1930	Conviction
Levy, Jack . . .	Lynn . . .	Salem . . .	Nov. 17, 1930	Conviction
L'Heureux, Henry E. . .	Salem . . .	Salem . . .	Oct. 21, 1930	Conviction
Massachusetts Mohican Company . . .	Waltham . . .	Waltham . . .	Jan. 30, 1930	Conviction
Sheroff, Samuel . . .	Boston . . .	Boston . . .	Feb. 17, 1930	Discharged
Smith, Max . . .	Boston . . .	Boston . . .	Jan. 22, 1930	Conviction
Sushel, Bernard . . .	Salem . . .	Salem . . .	Oct. 21, 1930	Conviction
Tublin, Jacob . . .	Fall River . . .	Fall River . . .	Feb. 18, 1930	Conviction
Turo, Pasquale . . .	Worcester . . .	Worcester . . .	Oct. 10, 1930	Conviction <sup>1</sup>
Van Dyk Company, James . . .	Fall River . . .	Fall River . . .	Jan. 24, 1930	Conviction
Van Dyk Company, James . . .	Worcester . . .	Worcester . . .	Nov. 5, 1930	Conviction



*For Sale of Drugs Deficient in Strength*

## SWEET SPIRIT OF NITRE

Jansen, Raymond . . .	New Bedford . . .	New Bedford . . .	Mar. 18, 1930	Conviction
Lavoine, Frank W. . .	Worcester . . .	Worcester . . .	Nov. 26, 1930	Conviction

1Appealed.

*For Violation of the Laws Relative to Cold Storage*

## SELLING COLD STORAGE EGGS WITHOUT MARKING THE CONTAINER

NAME	Address	Court	Date	Result
Alarakos, George . . .	Lowell . . .	Lowell . . .	Feb. 3, 1930	Conviction
Almeido, Paiva . . .	Framingham . . .	Framingham . . .	Jan. 9, 1930	Conviction
Arciszewski, Joseph . . .	Maynard . . .	Concord . . .	Dec. 23, 1929	Conviction
Ballas, James . . .	Peabody . . .	Peabody . . .	Dec. 18, 1929	Conviction
Block, Jacob . . .	Brighton . . .	Brighton . . .	Feb. 24, 1930	Conviction
Bonerba, Frank . . .	Beverly . . .	Salem . . .	Dec. 30, 1929	Conviction
Bunshaft, Walter . . .	Dorchester . . .	Dorchester . . .	Feb. 3, 1930	Conviction
Cerulli, Oreste . . .	Beverly . . .	Salem . . .	Dec. 30, 1929	Conviction
Ciba, Lawrence . . .	Fall River . . .	Fall River . . .	Feb. 4, 1930	Conviction
Cichon, Joseph . . .	Easthampton . . .	Northampton . . .	Jan. 3, 1930	Conviction
Ciejek, Peter . . .	Easthampton . . .	Northampton . . .	Jan. 3, 1930	Conviction
Clemens, Alfred E. . .	Allston . . .	Brighton . . .	Jan. 20, 1930	Conviction
Clement, Charles F. . .	Holyoke . . .	Holyoke . . .	Dec. 20, 1929	Conviction
Corte, Frank . . .	Beverly . . .	Salem . . .	Dec. 30, 1929	Conviction
Czelusniak, William . . .	Easthampton . . .	Northampton . . .	Jan. 3, 1930	Conviction
Doffiar, Allie . . .	Peabody . . .	Peabody . . .	Dec. 18, 1929	Conviction
Donald, Francis E. . .	Erving . . .	Orange . . .	Dec. 13, 1929	Conviction
Dzierzak, Alex . . .	Peabody . . .	Peabody . . .	Dec. 18, 1929	Conviction
Eliase, Tefoil . . .	Blackstone . . .	Blackstone . . .	Dec. 31, 1929	Conviction
Feliks, Karzimierz . . .	Fall River . . .	Fall River . . .	Feb. 4, 1930	Conviction
Filiault, Aurille J. . .	Springfield . . .	Springfield . . .	Feb. 6, 1930	Conviction
Gamelin, Aime . . .	Fall River . . .	Fall River . . .	Feb. 4, 1930	Conviction
Gawell, Andrew . . .	Blackstone . . .	Blackstone . . .	Dec. 31, 1929	Conviction
Geftas, Louis . . .	Lowell . . .	Lowell . . .	Feb. 24, 1930	Conviction
Georgeson, Mack . . .	Clinton . . .	Clinton . . .	Dec. 27, 1929	Conviction
Granfield, Thomas . . .	South Hadley . . .	Northampton . . .	Jan. 3, 1930	Conviction
Gutsky, Clement L. . .	Peabody . . .	Peabody . . .	Dec. 18, 1929	Conviction
Jeranian, George . . .	Watertown . . .	Waltham . . .	Dec. 28, 1929	Conviction
Jinski, Robert . . .	Brighton . . .	Brighton . . .	Feb. 19, 1930	Conviction
Katz, Samuel . . .	Springfield . . .	Springfield . . .	Feb. 6, 1930	Conviction
Kracun, Samuel . . .	Lowell . . .	Lowell . . .	Feb. 3, 1930	Conviction
Laberis, George . . .	Peabody . . .	Peabody . . .	Dec. 18, 1929	Conviction
Lawowicz, John . . .	Lowell . . .	Lowell . . .	Feb. 3, 1930	Conviction
Lyons, Frederick E. . .	Greenfield . . .	Greenfield . . .	Jan. 17, 1930	Conviction
Mann, Nicholas . . .	Fitchburg . . .	Fitchburg . . .	Dec. 13, 1929	Conviction
McPherson Symmes . . .	Mar- ket, Inc. . .	Gloucester . . .	Dec. 31, 1929	Conviction
Monahan, Harold J. . .	South Hadley Falls . . .	Northampton . . .	Jan. 3, 1930	Conviction
Monohan, Oci K. . .	Pittsfield . . .	Pittsfield . . .	Dec. 20, 1929	Conviction
Morey, John C. . .	Newburyport . . .	Newburyport . . .	Dec. 16, 1929	Conviction
Palazini, Palma . . .	Holyoke . . .	Holyoke . . .	Feb. 14, 1930	Conviction
Pantapas, Steven . . .	Peabody . . .	Peabody . . .	Dec. 18, 1929	Conviction
Patrylo, Wasyl . . .	Blackstone . . .	Blackstone . . .	Dec. 31, 1929	Conviction
Pevrisky, Joseph . . .	Beverly . . .	Salem . . .	Dec. 30, 1929	Conviction
Phillips, Antonio . . .	Peabody . . .	Peabody . . .	Dec. 18, 1929	Conviction
Pine, James F. . .	Fitchburg . . .	Fitchburg . . .	Dec. 13, 1929	Conviction
Pisani, Michael . . .	Beverly . . .	Salem . . .	Dec. 30, 1929	Conviction
Pugatch, Lewis . . .	Dorchester . . .	Dorchester . . .	Jan. 27, 1930	Conviction
Ricci, Michael . . .	Beverly . . .	Salem . . .	Dec. 30, 1929	Conviction
Ross, James . . .	Newburyport . . .	Newburyport . . .	Dec. 16, 1929	Conviction
Sacovitch, Anthony . . .	Peabody . . .	Peabody . . .	Dec. 18, 1929	Conviction
Sakovicz, Alfonse . . .	Framingham . . .	Framingham . . .	Jan. 9, 1930	Conviction
Sannartani, Samuel . . .	Natick . . .	Natick . . .	Jan. 10, 1930	Conviction
Sarris, Costas . . .	Lowell . . .	Lowell . . .	Feb. 3, 1930	Conviction
Silva, Joseph F. . .	Gloucester . . .	Gloucester . . .	Dec. 28, 1929	Conviction <sup>1</sup>
Skicus, Frank . . .	Brighton . . .	Brighton . . .	Feb. 19, 1930	Conviction
Skomial, Joseph . . .	Holyoke . . .	Holyoke . . .	Dec. 20, 1929	Conviction
Smith, Roland H. . .	Gloucester . . .	Gloucester . . .	Dec. 28, 1929	Conviction
Spaneous, Peter . . .	Salem . . .	Salem . . .	Nov. 4, 1930	Conviction
Stisz, John . . .	Easthampton . . .	Northampton . . .	Jan. 3, 1930	Conviction
Surette, Alberic . . .	Holyoke . . .	Holyoke . . .	Dec. 20, 1929	Conviction
Thomas, Spiros A. . .	Framingham . . .	Framingham . . .	Jan. 9, 1930	Conviction
Tracey, John J. . .	Gloucester . . .	Gloucester . . .	Dec. 28, 1929	Conviction
Tublin, Jacob . . .	Fall River . . .	Fall River . . .	Feb. 18, 1930	Conviction
Whitcomb, Fred J. . .	Clinton . . .	Clinton . . .	Dec. 12, 1929	Conviction
Winer Company, H. . .	Boston . . .	Boston . . .	Jan. 29, 1930	Conviction

*For Violations of the Laws Relative to Slaughtering*

## SLAUGHTERING OR AUTHORIZING SLAUGHTERING IN THE ABSENCE OF INSPECTOR

NAME	Address	Court	Date	Result
Balzarini, Emilio . . .	Rockport . . .	Gloucester . . .	Apr. 8, 1930	Conviction
Cohen, Max . . .	Methuen . . .	Lawrence . . .	July 1, 1930	Dismissed
Creeger, Abraham L. . .	Springfield . . .	Springfield . . .	July 3, 1930	Conviction
Ertel, Herman . . .	Pittsfield . . .	Adams . . .	Apr. 17, 1930	Discharged
Kuscek, Peter . . .	Chicopee . . .	Chicopee . . .	Mar. 12, 1930	Conviction
Prince, Henry . . .	Wenham . . .	Salem . . .	July 1, 1930	Conviction <sup>1</sup>
Shenkman, Oscar . . .	New Marlboro . . .	Great Barrington . . .	Sept. 26, 1930	Conviction
Stefanik, Wojciech . . .	Chicopee . . .	Chicopee . . .	Mar. 12, 1930	Conviction
Stevens, Henry O. . .	Enfield . . .	Ware . . .	Mar. 21, 1930	Conviction

1 Appealed.

For Violation of the Laws Relative to Cold Storage — Concluded

SELLING, OFFERING FOR SALE, OR HAVING IN POSSESSION WITH INTENT TO SELL, UNSTAMPED MEAT							
Balzarini, Antonio	.	Rockport	.	Gloucester	.	Apr. 8, 1930	Discharged
Balzarini, Emilio	.	Rockport	.	Gloucester	.	Apr. 8, 1930	Discharged
Wineberg, Jacob	.	Adams	.	Adams	.	Apr. 17, 1930	Conviction

ILLEGAL USE OF STAMP

Davis, William B.	.	Dartmouth	.	New Bedford	.	Nov. 14, 1930	Conviction
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ANIMAL DIED A NATURAL DEATH IN SLAUGHTERHOUSE

Cohen, Max	.	Methuen	.	Lawrence	.	July 1, 1930	Dismissed
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For Violation of the Mattress Laws

Blass, Max,	.	Chelsea	.	Chelsea	.	May 13, 1930	Conviction
Bornstein, Harry	.	Pittsfield	.	Williamstown	.	Sept. 25, 1930	Discharged
Fink, Herman	.	Pittsfield	.	Williamstown	.	Sept. 25, 1930	Discharged
Goldfine, Samuel	.	Pittsfield	.	Williamstown	.	Sept. 25, 1930	Discharged
Mover, Samuel	.	Boston	.	Boston	.	Mar. 28, 1930	Conviction
Rudnick, Morris	.	Williamstown	.	Williamstown	.	Oct. 6, 1930	Discharged
Shapiro, Julius	.	Chelsea	.	Chelsea	.	May 29, 1930	Conviction
Young, Samuel	.	Brockton	.	Brockton	.	Oct. 9, 1930	Conviction

Obstruction of an Inspector

Cohen, Max	.	Methuen	.	Lawrence	.	July 1, 1930	Conviction
Crane, James B.	.	Leominster	.	Leominster	.	May 2, 1930	Conviction

TABLE 2. — Summary of Analyses of Milk Samples Collected by the Inspectors in 1930

TOTAL SAMPLES					SAMPLES NOT DECLARED ADULTERATED			
	Number	Solids	Fat	Solids not fat	Number	Solids	Fat	Solids not fat
December	215	12.57	3.77	8.80	213	12.59	3.77	8.82
January	452	12.46	3.73	8.73	423	12.57	3.79	8.78
February	504	12.30	3.69	8.61	495	12.56	3.78	8.78
March	979	12.41	3.70	8.71	933	12.48	3.74	8.74
April	935	12.36	3.73	8.63	880	12.48	3.77	8.71
May	911	12.24	3.64	8.60	873	12.34	3.68	8.66
June	592	12.31	3.66	8.65	581	12.33	3.67	8.66
July	577	12.13	3.61	8.52	556	12.20	3.65	8.55
August	527	12.22	3.76	8.46	509	12.28	3.79	8.49
September	461	12.16	3.62	8.54	435	12.20	3.62	8.58
October	245	12.31	3.77	8.54	241	12.34	3.79	8.55
November	238	12.53	3.87	8.66	231	12.56	3.90	8.66
Totals	6,636	12.33	3.70	8.63	6,370	12.40	3.73	8.67

TABLE 3. — Summary of Milk Analyses

Number above the standard	.	.	.	.	.	.	.	4,535
Number below the standard	.	.	.	.	.	.	.	2,345
Total	.	.	.	.	.	.	.	6,880
Number having more than 15% Total Solids	.	.	.	.	.	.	.	31
“ “ between 14% and 15% Total Solids	.	.	.	.	.	.	.	130
“ “ “ 13% and 14% Total Solids	.	.	.	.	.	.	.	741
“ “ “ 12% and 13% Total Solids	.	.	.	.	.	.	.	3,633
“ “ “ 11% and 12% Total Solids	.	.	.	.	.	.	.	1,897
“ “ “ 10% and 11% Total Solids	.	.	.	.	.	.	.	357
“ “ “ 9% and 10% Total Solids	.	.	.	.	.	.	.	77
“ “ “ 8% and 9% Total Solids	.	.	.	.	.	.	.	12
“ “ less than 8% Total Solids	.	.	.	.	.	.	.	2
“ of samples having the cream removed	.	.	.	.	.	.	.	102
“ of samples of watered milk	.	.	.	.	.	.	.	165
“ of samples of skimmed milk above the legal standard	.	.	.	.	.	.	.	4

TABLE 4. — Summary of Bacterial Counts of Milk

CERTIFIED MILK				
Lowest count	.	.	.	1,600
Highest count	.	.	.	33,000
Less than 10,000 count	.	.	.	85 samples
Above 10,000 count	.	.	.	8 samples
Total	.	.	.	93 samples

TABLE 4. — *Summary of Bacterial Counts of Milk* — Concluded.

GRADE A MILK									
	Lowest count .	.	.	.	.	.	.	.	1,400
	Highest count .	.	.	.	.	.	.	.	82,000
Less than 25,000 count .	.	.	.	.	.	.	.	.	29 samples
Above 25,000 count .	.	.	.	.	.	.	.	.	7 samples
Total .	.	.	.	.	.	.	.	.	36 samples
PASTEURIZED MILK									
	Lowest count .	.	.	.	.	.	.	.	100
	Highest count .	.	.	.	.	.	.	.	3,200,000
Less than 50,000 count .	.	.	.	.	.	.	.	.	154 samples
Above 50,000 count .	.	.	.	.	.	.	.	.	55 samples
Less than 100,000 count .	.	.	.	.	.	.	.	.	168 samples
Total .	.	.	.	.	.	.	.	.	209 samples
RAW MILK INTENDED TO BE PASTEURIZED									
	Lowest count .	.	.	.	.	.	.	.	3,200
	Highest count .	.	.	.	.	.	.	.	15,000,000
Less than 50,000 count .	.	.	.	.	.	.	.	.	300 samples
Less than 300,000 count .	.	.	.	.	.	.	.	.	690 samples
Above 750,000 count .	.	.	.	.	.	.	.	.	415 samples
Total .	.	.	.	.	.	.	.	.	1,327 samples
RAW MILK SOLD AS SUCH									
	Lowest count .	.	.	.	.	.	.	.	4,400
	Highest count .	.	.	.	.	.	.	.	1,800,000
Less than 50,000 count .	.	.	.	.	.	.	.	.	11 samples
Less than 300,000 count .	.	.	.	.	.	.	.	.	23 samples
Above 300,000 count .	.	.	.	.	.	.	.	.	7 samples
Total .	.	.	.	.	.	.	.	.	30 samples
Total .	.	.	.	.	.	.	.	.	1,695 samples

TABLE 5. — *Summary of Food Statistics*

CHARACTER OF SAMPLE	Genuine	Adulterated	Total
Apples .	30	—	30
Butter .	11	8	19
Canned Foods .	5	—	5
Cider .	24	8	32
Clams .	30	12	42
Cocoa .	4	—	4
Condensed Milk .	2	—	2
Confectionery .	9	4	13
Cream .	134	35	169
Dried Fruits .	—	3	3
Egg Noodles .	—	2	2
Eggs .	293	203	496
Flavoring Extracts:			
Ginger .	12	1	13
Lemon .	5	2	7
Orange .	1	—	1
Peppermint .	2	—	2
Vanilla .	12	2	14
Honey .	3	—	3
Ice Cream .	6	—	6
Maple Sugar .	5	—	5
Maple Syrup .	7	7	14
Mayonnaise .	14	—	14
Meat Products:			
Hamburg .	39	19	58
Sausage .	560	71	631
Olive Oil .	4	1	5
Oysters .	1	—	1
Peanut Butter .	8	—	8
Pepper .	1	—	1
Scallops .	7	—	7
Soft Drinks .	6	12	18
Sugar .	1	1	2
Vinegar .	53	3	56
Miscellaneous Food .	32	4	36
	1,323	400	1,723
Caustic Poison .	—	1	1
Mattress Filling .	1	2	3
Metal Polish .	1	—	1



TABLE 6. — *Summary of Bacteriological Examination of Shellfish*

MUSSELS			QUAHOGS		
Bacillus Coli Score	Samples		Bacillus Coli Score	Samples	
5 or less . . . . .	1		5 or less . . . . .	20	
230 . . . . .	1		23 . . . . .	1	
320 . . . . .	2		50 . . . . .	2	
			5,000 . . . . .	1	
Total . . . . .	4		Total . . . . .	24	
SOFT SHELL CLAMS			SHUCKED CLAMS		
Bacillus Coli Score	Samples		Bacillus Coli Score	Samples	
5 or less . . . . .	74		5 or less . . . . .	87	
14 . . . . .	9		14 . . . . .	16	
23 . . . . .	5		23 . . . . .	4	
32 . . . . .	6		32 . . . . .	10	
41 . . . . .	5		41 . . . . .	5	
50 . . . . .	15		50 . . . . .	31	
140 . . . . .	12		140 . . . . .	5	
230 . . . . .	10		230 . . . . .	6	
320 . . . . .	3		320 . . . . .	5	
410 . . . . .	2		410 . . . . .	3	
500 . . . . .	5		500 . . . . .	20	
4,100 . . . . .	1		2,300 . . . . .	1	
			5,000 . . . . .	3	
			50,000 . . . . .	5	
Total . . . . .	147		Total . . . . .	201	
Total samples . . . . .					376
Polluted samples . . . . .					133
Per cent samples polluted . . . . .					35.4

TABLE 7. — *Liquor Report for 1930*  
*Character of Samples*

CITIES AND TOWNS	Beer	Cider	Wine	Distilled Spirits	Extracts	Alcohol	Miscellaneous	Total
Boston . . . . .	417	—	141	1,833	8	385	92	2,876
Cambridge . . . . .	73	—	20	254	3	30	17	397
Chelsea . . . . .	74	—	4	43	—	7	1	129
Dedham . . . . .	4	—	9	6	—	5	1	25
Everett . . . . .	15	—	8	74	—	12	—	109
Fall River . . . . .	26	—	2	56	3	1	1	89
Fitchburg . . . . .	32	—	9	5	—	7	5	58
Gardner . . . . .	32	—	4	23	4	6	4	73
Gloucester . . . . .	11	—	13	32	3	27	3	89
Haverhill . . . . .	60	8	10	32	—	2	6	118
Hull . . . . .	15	—	—	15	—	3	—	33
Lowell . . . . .	46	—	6	113	1	7	9	182
Lynn . . . . .	17	—	9	77	—	14	—	117
Malden . . . . .	12	—	4	74	—	7	—	97
Marlborough . . . . .	27	—	24	28	—	2	3	84
Medford . . . . .	12	—	2	10	—	1	—	25
Peabody . . . . .	28	1	4	34	—	—	—	67
Plymouth . . . . .	20	1	37	17	—	7	4	86
Quincy . . . . .	10	—	13	14	—	6	4	47
Revere . . . . .	19	—	2	13	—	—	—	34
Salem . . . . .	30	—	5	35	—	33	3	106
Somerville . . . . .	29	—	2	82	—	12	2	127
Springfield . . . . .	19	—	2	25	—	7	7	60
Taunton . . . . .	24	—	3	17	—	1	2	47
Waltham . . . . .	3	—	6	15	—	24	—	48
Wareham . . . . .	3	—	1	20	—	1	—	25
Watertown . . . . .	9	—	18	11	1	3	6	48
Department of Public Safety . . . . .	147	3	30	225	3	36	13	457
Miscellaneous* . . . . .	237	18	50	303	1	62	22	693
Totals . . . . .	1,451	31	438	3,486	27	708	205	6,346

\*From 99 towns submitting less than twenty-five samples each.

TABLE 8. — *Summary of Drug Statistics*

CHARACTER OF SAMPLE	Genuine	Adulterated	Total
Blue Ointment . . . . .	1	—	1
Camphorated Oil . . . . .	3	1	4
Castor Oil . . . . .	1	—	1
Cod Liver Oil . . . . .	1	—	1
Ether . . . . .	17	4	21
Extract of Ginger . . . . .	1	—	1
Hydrogen Dioxide Solution . . . . .	1	—	1
Lime Water . . . . .	13	3	16
Linseed Meal . . . . .	1	—	1

TABLE 8. — *Summary of Drug Statistics* — Continued

Magnesium Citrate Solution . . . . .	6	1	7
Prescriptions . . . . .	4	2	6
Proprietary Remedies . . . . .	9	2	11
Spirit of Anise . . . . .	1	—	1
Spirit of Camphor . . . . .	3	—	3
Spirit of Nitrous Ether . . . . .	38	29	67
Syrup of Cocillana . . . . .	1	—	1
	101	42	143

TABLE 9. — *Summary of Slaughtering Inspections from December 1, 1929, through November 30, 1930*

Total Number of Carcasses Inspected . . . . .	187,086	Total Number of Carcasses Condemned . . . . .	2,238
Cattle . . . . .	25,969	Cattle . . . . .	604
Calves . . . . .	95,988	Calves . . . . .	1,379
Hogs . . . . .	54,540	Hogs . . . . .	229
Sheep . . . . .	10,589	Sheep . . . . .	26

REASONS FOR CONDEMNATION	Cattle	Calves	Hogs	Sheep	Totals
Immaturity . . . . .	—	1,242	—	—	1,242
Tuberculosis . . . . .	527	29	73	—	629
Cholera . . . . .	—	—	59	—	59
Died otherwise than by slaughter . . . . .	7	37	8	3	55
Injured . . . . .	17	9	4	15	45
Pneumonia . . . . .	8	8	27	—	43
Septicaemia . . . . .	15	2	16	—	33
Malnutrition . . . . .	10	6	11	1	28
Exhaustion . . . . .	—	13	1	—	14
Enteritis . . . . .	—	13	—	—	13
Peritonitis . . . . .	8	—	3	—	11
Scours . . . . .	—	9	—	—	9
Bitten by dogs . . . . .	—	—	1	7	8
Tumor . . . . .	—	—	6	—	6
Abscesses . . . . .	2	—	3	—	5
Indigestion . . . . .	1	1	3	—	5
Icterus . . . . .	—	1	3	—	4
Pleuritis . . . . .	—	1	3	—	4
Parturient Paresis . . . . .	3	—	1	—	4
Urticaria . . . . .	—	—	3	—	3
Pyemia . . . . .	1	2	—	—	3
Stillborn . . . . .	—	2	—	—	2
Slaughtered illegally . . . . .	—	1	1	—	2
Nephritis . . . . .	1	1	—	—	2
Parturition . . . . .	1	—	—	—	1
Strangulation . . . . .	1	—	—	—	1
Rheumatism . . . . .	—	—	1	—	1
Verminous . . . . .	—	—	1	—	1
Ruptured . . . . .	—	1	—	—	1
Actinomycosis . . . . .	—	—	1	—	1
Phlebitis . . . . .	—	1	—	—	1
Rabies . . . . .	1	—	—	—	1
Pericarditis . . . . .	1	—	—	—	1
Totals . . . . .	604	1,379	229	26	2,238

*Summary of Tables 10, 11 and 12*

Requests for extension of time granted . . . . .	287
Butter . . . . .	36
Eggs . . . . .	35
Poultry . . . . .	93
Meat . . . . .	44
Fish . . . . .	79
Requests for extension of time not granted . . . . .	20
Butter . . . . .	1
Eggs . . . . .	1
Poultry . . . . .	7
Meat . . . . .	2
Fish . . . . .	9
Articles ordered removed from storage (no requests made) . . . . .	158
Butter . . . . .	5
Eggs . . . . .	3
Poultry . . . . .	86
Game . . . . .	2
Meat . . . . .	18
Fish . . . . .	44

TABLE 10. — *Requests for Extension of Time Granted on Goods in Cold Storage from December 1, 1929, to December 1, 1930*

[Reason for such extension being that goods were in proper condition for further storage.]

ARTICLE	Weight (Pounds)	Placed in Storage	Extension Granted to —	Name
Butter	18,900	Oct. 4, 1929	Dec. 31, 1930	Droste & Snyder, Inc.
Butter	18,476	Oct. 7, 1929	Dec. 31, 1930	Droste & Snyder, Inc.
Butter	18,333	Oct. 22, 1929	Dec. 31, 1930	Droste & Snyder, Inc.
Butter	19,593	June 8, 1929	Dec. 8, 1930	Fairmont Creamery Co.
Butter	9,920	July 9, 1929	Jan. 8, 1931	Fairmont Creamery Co.
Butter	18,505	July 25, 1929	Jan. 25, 1931	Fairmont Creamery Co.
Butter	120	July 8, 1929	Aug. 8, 1930	Fleishman, P.
Butter	5,670	July 12, 1929	Nov. 1, 1930	Friedman, Miles, Inc.
Butter	4,992	July 12, 1929	Nov. 1, 1930	Friedman, Miles, Inc.
Butter	19,719	July 18, 1929	Nov. 1, 1930	Friedman, Miles, Inc.
Butter	19,968	Aug. 7, 1929	Dec. 1, 1930	Friedman, Miles, Inc.
Butter	6,500	Aug. 12, 1929	Dec. 1, 1930	Friedman, Miles, Inc.
Butter	19,968	Aug. 14, 1929	Dec. 1, 1930	Friedman, Miles, Inc.
Butter	19,968	Aug. 14, 1929	Dec. 1, 1930	Friedman, Miles, Inc.
Butter	19,467	Sept. 11, 1929	Dec. 1, 1930	Friedman, Miles, Inc.
Butter	18,270	Sept. 11, 1929	Dec. 1, 1930	Friedman, Miles, Inc.
Butter	17,640	Sept. 16, 1929	Dec. 1, 1930	Friedman, Miles, Inc.
Butter	1,800	June 26, 1929	Dec. 26, 1930	Friedman, Miles, Inc.
Butter	1,740	June 26, 1929	Dec. 26, 1930	Friedman, Miles, Inc.
Butter	2,220	June 26, 1929	Dec. 26, 1930	Friedman, Miles, Inc.
Butter	6,060	June 26, 1929	Dec. 26, 1930	Friedman, Miles, Inc.
Butter	1,380	June 26, 1929	Dec. 26, 1930	Friedman, Miles, Inc.
Butter	3,000	June 26, 1929	Dec. 26, 1930	Friedman, Miles, Inc.
Butter	2,760	June 26, 1929	Dec. 26, 1930	Friedman, Miles, Inc.
Butter	6,300	Aug. 7, 1929	Sept. 7, 1930	Ganem, Joseph & Sons
Butter	780	June 13, 1929	Aug. 31, 1930	Giles Cummings Co., Inc.
Butter	2,048	July 11, 1929	Oct. 31, 1930	Giles Cummings Co., Inc.
Butter	1,023	May 25, 1929	July 25, 1930	Lewis-Mears Co.
Butter	1,197	June 1, 1929	Aug. 1, 1930	Lewis-Mears Co.
Butter	960	June 26, 1929	Aug. 26, 1930	Lewis-Mears Co.
Butter	5,580	July 1, 1929	Sept. 1, 1930	NewEnglandConfectioneryCo.
Butter	3,450	Apr. 16, 1929	May 16, 1930	Stevens, Genery Co.
Butter	540	July 18, 1929	Sept. 3, 1930	Stone, Charles H. Co.
Butter	540	July 18, 1929	Sept. 3, 1930	Stone, Charles H. Co.
Butter	12,480	July 13, 1929	Oct. 13, 1930	Stone, Charles H. Co.
Butter	90	July 17, 1929	Oct. 20, 1930	WorcesterStateNormalSchool
Eggs	23,168	July 29, 1929	Oct. 20, 1930	Keith, H. J. Co., Inc.
Eggs	7,500	May 10, 1929	June 15, 1930	National Biscuit Co.
Eggs, frozen	1,910	July 9, 1929	Jan. 9, 1931	Keith, H. J. Co., Inc.
Eggs, " sugared*	6,120	June 10, 1930	Oct. 1, 1930	Swift & Co.
Eggs, " *	10,500	June 10, 1930	Jan. 1, 1931	Swift & Co.
Eggs, sugared	5,100	May 23, 1929	Jan. 1, 1931	Quincy Market Cold Storage & Warehouse Co.
Egg yolks	27,250	Mar. 30, 1929	July 7, 1930	Armour and Co.
Egg yolks	2,790	Apr. 23, 1929	June 23, 1930	Holland Butter Co., The
Egg yolks	4,386	May 10, 1929	Nov. 10, 1930	Keith, H. J. Co., Inc.
Egg yolks	3,828	May 1, 1929	July 30, 1930	Layton, John Co., Inc., The
Egg yolks	1,540	May 1, 1929	July 30, 1930	Layton, John Co., Inc., The
Egg yolks	3,212	May 1, 1929	Oct. 31, 1930	Layton, John Co., Inc., The
Egg yolks	2,356	May 1, 1929	July 1, 1930	Smith, A. M. Co.
Egg yolks	660	July 9, 1929	Jan. 1, 1931	Swift & Co.
Egg yolks	1,130	July 9, 1929	Jan. 1, 1931	Swift & Co.
Eggs, mixe	240	Apr. 17, 1929	Nov. 1, 1930	Emulsol Corporation, The
Eggs, mixed	35,100	Apr. 14, 1929	June 1, 1930	Gersh, Bernard Co.
Eggs, mixed	9,600	Apr. 8, 1929	Oct. 29, 1930	Keith, H. J. Co., Inc.
Eggs, mixed	352	May 1, 1929	June 1, 1930	Layton, John Co., Inc., The
Eggs, mixed	3,080	May 1, 1929	July 31, 1930	Layton, John Co., Inc., The
Eggs, mixed	9,044	May 1, 1929	July 31, 1930	Layton, John Co., Inc., The
Eggs, mixed	43,340	May 1, 1929	Oct. 31, 1930	Layton, John Co., Inc., The
Eggs, mixed	1,080	May 7, 1929	July 7, 1930	Lewis-Mears Co.
Eggs, mixed	5,100	July 9, 1929	Jan. 1, 1931	Swift & Co.
Egg whites	8,490	Apr. 5, 1929	July 5, 1930	Armour and Co.
Egg whites	2,370	Apr. 22, 1929	Sept. 1, 1930	Emulsol Corporation, The
Egg whites	30	Apr. 22, 1929	Sept. 1, 1930	Emulsol Corporation, The
Egg whites	120	Apr. 22, 1929	Sept. 1, 1930	Emulsol Corporation, The
Egg whites	2,370	Apr. 22, 1929	Nov. 1, 1930	Emulsol Corporation, The
Egg whites	30	Apr. 22, 1929	Nov. 1, 1930	Emulsol Corporation, The
Egg whites	120	Apr. 22, 1929	Nov. 1, 1930	Emulsol Corporation, The
Egg whites	6,030	May 21, 1929	Nov. 8, 1930	Keith, H. J. Co., Inc.
Egg whites	704	May 1, 1929	July 31, 1930	Layton, John Co., Inc., The
Egg whites	4,400	May 1, 1929	Oct. 31, 1930	Layton, John Co., Inc., The
Egg whites	1,612	May 1, 1929	July 1, 1930	Smith, A. M. Co.
Broilers	900	Aug. 27, 1929	Oct. 27, 1930	Bartlett, Varney & Co., Inc.
Broilers	493	Sept. 4, 1929	Nov. 3, 1930	Bartlett, Varney & Co., Inc.
Broilers	361	Sept. 4, 1929	Nov. 3, 1930	Bartlett, Varney & Co., Inc.
Broilers	451	Oct. 2, 1929	Dec. 1, 1930	Bartlett, Varney & Co., Inc.
Broilers	646	Oct. 9, 1929	Dec. 8, 1930	Bartlett, Varney & Co., Inc.
Broilers	133	Oct. 14, 1929	Dec. 13, 1930	Bartlett, Varney & Co., Inc.
Broilers	226	July 27, 1929	Aug. 27, 1930	Lewis-Mears Co.
Broilers	2,664	Nov. 27, 1929	Feb. 27, 1931	Thorndike & Gerrish Co.
Broilers & Fowl	874	Sept. 25, 1929	Nov. 24, 1930	Bartlett, Varney & Co., Inc.

\*Received frozen and undated



TABLE 10. — *Requests for Extension of Time Granted on Goods in Cold Storage from December 1, 1929, to December 1, 1930 — Continued*

ARTICLE	Weight (Pounds)	Placed in Storage	Extension Granted to —	Name
Capons	562	Jan. 19, 1929	Apr. 19, 1930	Hosmer, F. H. & Co.
Capons	904	Jan. 19, 1929	Apr. 19, 1930	Hosmer, F. H. & Co.
Chickens	500	Aug. 31, 1929	Oct. 30, 1930	Bartlett, Varney & Co., Inc.
Chickens	1,025	Oct. 17, 1929	Dec. 16, 1930	Bartlett, Varney & Co., Inc.
Chickens	150	Dec. 4, 1928	Mar. 1, 1930	Corwin, C. R. Co.
Chickens	1,200	Dec. 10, 1928	Mar. 1, 1930	Corwin, C. R. Co.
Chickens	250	Dec. 12, 1928	Mar. 1, 1930	Corwin, C. R. Co.
Chickens	343	Dec. 20, 1928	Mar. 1, 1930	Corwin, C. R. Co.
Chickens	300	Dec. 26, 1928	Mar. 1, 1930	Corwin, C. R. Co.
Chickens	200	Dec. 28, 1928	Mar. 1, 1930	Corwin, C. R. Co.
Chickens	742	Dec. 31, 1928	Mar. 1, 1930	Corwin, C. R. Co.
Chickens	3,500	Oct. 21, 1929	Jan. 20, 1931	Fletcher, J. V. Co.
Chickens	750	Oct. 25, 1929	Jan. 20, 1931	Fletcher, J. V. Co.
Chickens	4,204	Nov. 19, 1929	Feb. 20, 1931	Fletcher, J. V. Co.
Chickens	507	Nov. 26, 1928	Feb. 26, 1930	Hosmer, F. H. & Co.
Chickens	443	Nov. 27, 1928	Feb. 27, 1930	Hosmer, F. H. & Co.
Chickens	364	Nov. 27, 1928	Feb. 27, 1930	Hosmer, F. H. & Co.
Chickens	1,320	Nov. 27, 1928	Feb. 27, 1930	Hosmer, F. H. & Co.
Chickens	616	Dec. 1, 1928	Mar. 1, 1930	Hosmer, F. H. & Co.
Chickens	609	Dec. 1, 1928	Mar. 1, 1930	Hosmer, F. H. & Co.
Chickens	660	Dec. 7, 1928	Mar. 7, 1930	Hosmer, F. H. & Co.
Chickens	596	Dec. 7, 1928	Mar. 7, 1930	Hosmer, F. H. & Co.
Chickens	2,548	Dec. 7, 1928	Mar. 7, 1930	Hosmer, F. H. & Co.
Chickens	440	Dec. 7, 1928	Mar. 7, 1930	Hosmer, F. H. & Co.
Chickens	2,232	Dec. 10, 1928	Mar. 10, 1930	Hosmer, F. H. & Co.
Chickens	1,425	Dec. 10, 1928	Mar. 10, 1930	Hosmer, F. H. & Co.
Chickens	2,635	Dec. 11, 1928	Mar. 12, 1930	Hosmer, F. H. & Co.
Chickens	1,850	Dec. 18, 1928	Mar. 18, 1930	Hosmer, F. H. & Co.
Chickens	387	Dec. 18, 1928	Mar. 18, 1930	Hosmer, F. H. & Co.
Chickens	708	Dec. 19, 1928	Mar. 19, 1930	Hosmer, F. H. & Co.
Chickens	1,950	Dec. 19, 1928	Mar. 19, 1930	Hosmer, F. H. & Co.
Chickens	344	Dec. 19, 1928	Mar. 19, 1930	Hosmer, F. H. & Co.
Chickens	2,520	Dec. 19, 1928	Mar. 19, 1930	Hosmer, F. H. & Co.
Chickens	281	Dec. 19, 1928	Mar. 19, 1930	Hosmer, F. H. & Co.
Chickens	500	Dec. 20, 1928	Mar. 20, 1930	Hosmer, F. H. & Co.
Chickens	616	Dec. 20, 1928	Mar. 20, 1930	Hosmer, F. H. & Co.
Chickens	157	Dec. 20, 1928	Mar. 20, 1930	Hosmer, F. H. & Co.
Chickens	498	Dec. 20, 1928	Mar. 20, 1930	Hosmer, F. H. & Co.
Chickens	1,596	Dec. 20, 1928	Mar. 20, 1930	Hosmer, F. H. & Co.
Chickens	800	Dec. 20, 1928	Mar. 20, 1930	Hosmer, F. H. & Co.
Chickens	3,685	Dec. 29, 1928	Mar. 29, 1930	Hosmer, F. H. & Co.
Chickens	25,732	Dec. 30, 1928	Mar. 30, 1930	Hosmer, F. H. & Co.
Chickens	1,216	Dec. 31, 1928	Mar. 31, 1930	Hosmer, F. H. & Co.
Chickens	229	Jan. 26, 1929	Apr. 26, 1930	Hosmer, F. H. & Co.
Chickens	443	Mar. 15, 1929	June 15, 1930	Hosmer, F. H. & Co.
Chickens	1,078	Mar. 25, 1929	June 25, 1930	Hosmer, F. H. & Co.
Chickens	459	Apr. 17, 1929	July 17, 1930	Hosmer, F. H. & Co.
Chickens	377	Apr. 17, 1929	July 17, 1930	Hosmer, F. H. & Co.
Chickens	536	Apr. 17, 1929	July 17, 1930	Hosmer, F. H. & Co.
Chickens	2,493	Apr. 29, 1929	July 29, 1930	Hosmer, F. H. & Co.
Chickens	4,982	Apr. 29, 1929	July 29, 1930	Hosmer, F. H. & Co.
Chickens	2,914	Apr. 29, 1929	July 29, 1930	Hosmer, F. H. & Co.
Chickens	935	Apr. 29, 1929	July 29, 1930	Hosmer, F. H. & Co.
Chickens	1,000	Apr. 20, 1929	July 29, 1930	Hosmer, F. H. & Co.
Chickens	456	Apr. 20, 1929	July 29, 1930	Hosmer, F. H. & Co.
Chickens	841	Apr. 29, 1929	July 29, 1930	Hosmer, F. H. & Co.
Chickens	760	Oct. 4, 1929	Jan. 10, 1931	Weston-Thurston Co.
Chickens, guinea	3,037	Dec. 28, 1928	May 1, 1930	Lamson & Co.
Chickens, guinea	6,885	Jan. 1, 1929	Oct. 15, 1930	Lamson & Co.
Chickens, guinea	4,536	Jan. 1, 1929	Oct. 15, 1930	Lamson & Co.
Fowl	140	Dec. 18, 1928	Mar. 18, 1930	Hosmer, F. H. & Co.
Fowl	1,200	Aug. 27, 1929	Oct. 27, 1930	Bartlett, Varney & Co.
Fowl	1,200	Aug. 27, 1929	Oct. 27, 1930	Bartlett, Varney & Co.
Fowl	1,102	Sept. 11, 1929	Nov. 10, 1930	Bartlett, Varney & Co.
Fowl	860	Sept. 11, 1929	Nov. 10, 1930	Bartlett, Varney & Co.
Poultry	4,500	May 10, 1929	Aug. 10, 1930	Thorndike & Gerrish Co.
Poultry	2,250	May 9, 1929	Aug. 10, 1930	Thorndike & Gerrish Co.
Poultry	4,450	May 9, 1929	Aug. 10, 1930	Thorndike & Gerrish Co.
Poultry	2,400	May 9, 1929	Aug. 10, 1930	Thorndike & Gerrish Co.
Turkeys	1,928	May 1, 1929	Sept. 1, 1930	Austin, G. M. & Son
Turkeys	990	Nov. 26, 1929	Dec. 26, 1930	Fairmont Creamery Co., The
Turkeys	4,664	Nov. 26, 1929	Dec. 26, 1930	Fairmont Creamery Co., The
Turkeys	3,500	Dec. 28, 1928	Mar. 1, 1930	First National Stores, Inc.
Turkeys	2,300	Dec. 28, 1928	Mar. 1, 1930	First National Stores, Inc.
Turkeys	456	Dec. 27, 1928	Mar. 27, 1930	Hosmer, F. H. & Co.
Turkeys	2,299	Dec. 29, 1928	Mar. 29, 1930	Hosmer, F. H. & Co.
Turkeys	760	Jan. 26, 1929	Apr. 26, 1930	Hosmer, F. H. & Co.
Turkeys	247	Jan. 26, 1929	Apr. 26, 1930	Hosmer, F. H. & Co.
Turkeys	228	Mar. 2, 1929	June 2, 1930	Hosmer, F. H. & Co.
Turkeys	2,139	Mar. 6, 1929	June 6, 1930	Hosmer, F. H. & Co.
Turkeys	4,497	Mar. 26, 1929	June 26, 1930	Hosmer, F. H. & Co.
Turkeys	9,673	Mar. 28, 1929	June 28, 1930	Hosmer, F. H. & Co.
Turkeys	2,800	Dec. 1, 1928	Aug. 1, 1930	Lamson & Co.

TABLE 10. — *Requests for Extension of Time Granted on Goods in Cold Storage from December 1, 1929, to December 1, 1930 — Continued*

ARTICLE	Weight (Pounds)	Placed in Storage	Extension Granted to —	Name
Turkeys . . . . .	5,540	May 1, 1929	Sept. 1, 1930	Lamson & Co.
Beef . . . . .	77,908	Aug. 1, 1929	Nov. 1, 1930	Batchelder, Snyder, Dorr & Doe Co.
Beef . . . . .	11,000	Aug. 29, 1929*	Mar. 1, 1930	Benjamin, A. H. Import Corporation
Beef . . . . .	26,000	Aug. 29, 1929*	Mar. 1, 1931	Benjamin, A. H. Import Corporation
Beef . . . . .	8,800	Aug. 29, 1929*	Mar. 1, 1931	Benjamin, A. H. Import Corporation
Beef . . . . .	36,000	Aug. 29, 1929*	Mar. 1, 1931	Benjamin, A. H. Import Corporation
Beef . . . . .	120,000	Sept. 29, 1929*	Dec. 29, 1930	Benjamin, A. H. Import Corporation
Beef . . . . .	80,000	Sept. 29, 1929*	Dec. 29, 1930	Benjamin, A. H. Import Corporation
Beef . . . . .	80,000	Sept. 29, 1929*	Dec. 29, 1930	Benjamin, A. H. Import Corporation
Beef . . . . .	80,000	Sept. 29, 1929*	Dec. 29, 1930	Benjamin, A. H. Import Corporation
Beef . . . . .	2,585	Mar. 10, 1929	May 10, 1930	Benjamin, A. H. Import Corporation
Beef . . . . .	20,200	Mar. 10, 1929	May 10, 1930	Benjamin, A. H. Import Corporation
Beef . . . . .	4,080	Mar. 10, 1929	May 10, 1930	Brighton Dressed Meat Co.
Beef . . . . .	1,716	Apr. 28, 1929	Sept. 15, 1930	Brighton Dressed Meat Co.
Beef . . . . .	20,144	Apr. 28, 1929	Sept. 15, 1930	Brighton Dressed Meat Co.
Beef . . . . .	5,945	Apr. 28, 1929	Sept. 15, 1930	Brighton Dressed Meat Co.
Beef . . . . .	20,000	Oct. 4, 1929	Feb. 17, 1931	Liberty Beef Co.
Beef . . . . .	27,500	Nov. 8, 1929	Mar. 8, 1931	Liberty Beef Co.
Beef fores . . . . .	33,000	Sept. 14, 1929	Mar. 14, 1931	Benjamin, A. H. Import Corporation
Beef hinds . . . . .	33,000	Sept. 14, 1929	Mar. 14, 1931	Benjamin, A. H. Import Corporation
Beef livers . . . . .	12,020	Dec. 23, 1928	Mar. 23, 1930	Handy, H. L. Co.
Beef livers . . . . .	27,915	Jan. 7, 1929	Apr. 7, 1930	Handy, H. L. Co.
Beef loins . . . . .	5,715	Apr. 6, 1929	July 6, 1930	Batchelder, Snyder, Dorr & Doe Co.
Lamb . . . . .	1,887	Sept. 26, 1929	Oct. 25, 1930	Armour and Co.
Lamb . . . . .	5,870	Oct. 25, 1929	Dec. 25, 1930	Armour and Co.
Lamb . . . . .	4,240	Nov. 8, 1929	Jan. 8, 1931	Armour and Co.
Lamb . . . . .	4,500	Nov. 8, 1929	Mar. 8, 1931	Armour and Co.
Lamb . . . . .	10,600	Nov. 8, 1929	Mar. 8, 1931	Armour and Co.
Lamb . . . . .	19,160	Dec. 18, 1928	Sept. 13, 1930	Batchelder, Snyder, Dorr & Doe Co.
Lamb . . . . .	2,714	Sept. 14, 1929	Nov. 15, 1930	Batchelder, Snyder, Dorr & Doe Co.
Lamb . . . . .	15,800	Dec. 18, 1928	Apr. 1, 1930	Benjamin, A. H. Import Corporation
Lamb . . . . .	1,629	July 20, 1929	Oct. 1, 1930	Schwartz, Lewis N.
Lamb . . . . .	21,829	Apr. 11, 1929	July 1, 1930	Wilson & Co.
Mutton . . . . .	1,951	Sept. 14, 1929	Nov. 13, 1930	Batchelder, Snyder, Dorr & Doe Co.
Mutton . . . . .	838	Sept. 20, 1929	Dec. 20, 1930	Richards, Albert Co., Inc.
Veal . . . . .	15,525	Oct. 3, 1929	Dec. 3, 1930	Armour and Company
Veal . . . . .	2,800	Nov. 21, 1929	Mar. 21, 1931	Armour and Company
Yearling fores . . . . .	1,069	Sept. 12, 1929	Dec. 12, 1930	Richards, Albert Co., Inc.
Yearling fores . . . . .	1,319	Sept. 26, 1929	Dec. 26, 1930	Richards, Albert Co., Inc.
Yearling legs . . . . .	1,040	Sept. 17, 1929	Oct. 17, 1930	Kent Bros.
Yearling legs . . . . .	1,675	Sept. 19, 1929	Oct. 19, 1930	Kent Bros.
Yearling legs . . . . .	1,851	Sept. 13, 1929	Nov. 12, 1930	Batchelder, Snyder, Dorr & Doe Co.
Yearling legs . . . . .	1,139	Sept. 28, 1929	Dec. 28, 1930	Richards, Albert Co., Inc.
Pork livers . . . . .	11,650	Jan. 17, 1929	Mar. 30, 1930	Brighton Dressed Meat Co.
Pork livers . . . . .	8,750	Jan. 23, 1929	Apr. 4, 1930	Blair's Market
Bass, sea . . . . .	351	May 23, 1929	Nov. 1, 1930	Cassius Hunt Co.
Bass, sea . . . . .	121	May 24, 1929	Nov. 1, 1930	Cassius Hunt Co.
Bass, sea . . . . .	540	May 31, 1929	Nov. 1, 1930	Cassius Hunt Co.
Bluefish . . . . .	150	July 17, 1929	Dec. 31, 1930	Coleman & Son Co.
Butterfish . . . . .	1,375	June 21, 1929	Dec. 31, 1930	Busalacchi Bros.
Butterfish . . . . .	150	June 21, 1929	Nov. 21, 1930	Whitman, Ward & Lee Co.
Cod filets . . . . .	7,965	—†	Dec. 19, 1930	Collins, Lee Co.
Eels . . . . .	275	July 16, 1929	Dec. 16, 1930	Russo & Sons
Eels . . . . .	960	Oct. 4, 1929	Dec. 20, 1930	Russo & Sons
Flats, black back**	3,628	Oct. 10, 1929	Apr. 10, 1931	Burns-McKeon Co.
Hake, skinned . . . . .	1,900	Nov. 2, 1929	Feb. 1, 1931	Collins, Lee Co.
Hake, skinned . . . . .	2,430	Nov. 2, 1929	Feb. 1, 1931	Collins, Lee Co.
Hake, skinned . . . . .	1,840	Nov. 11, 1929	Feb. 1, 1931	Collins, Lee Co.
Hake, skinned . . . . .	1,460	Nov. 8, 1929	Feb. 1, 1931	Collins, Lee Co.
Hake, skinned . . . . .	30	Nov. 7, 1929	Feb. 1, 1931	Collins, Lee Co.
Hake, skinned . . . . .	2,660	Nov. 4, 1929	Feb. 1, 1931	Collins, Lee Co.
Hake, skinned . . . . .	500	Nov. 14, 1929	Feb. 1, 1931	Collins, Lee Co.

\*Imported.

†Frozen and Undated.

\*\*Bait.

TABLE 10. — *Requests for Extension of Time Granted on Goods in Cold Storage from December 1, 1929, to December 1, 1930 — Concluded*

ARTICLE	Weight (Pounds)	Placed in Storage	Extension Granted to —	Name
Hake, skinned	150	Nov. 14, 1929	Feb. 1, 1931	Collins, Lee Co.
Hake, skinned	60	Nov. 14, 1929	Feb. 1, 1931	Collins, Lee Co.
Hake, skinned	640	Nov. 14, 1929	Feb. 1, 1931	Collins, Lee Co.
Haddock fillets	405	July 12, 1929	Nov. 1, 1930	Boston Fish Pier Co.
Haddock fillets	120	July 5, 1929	Nov. 1, 1930	Boston Fish Pier Co.
Haddock fillets	450	July 19, 1929	Nov. 1, 1930	Boston Fish Pier Co.
Haddock fillets	300	July 1, 1929	Dec. 1, 1930	Burns-McKeon Co.
Haddock fillets	750	Aug. 3, 1929	Dec. 1, 1930	Burns-McKeon Co.
Haddock fillets	330	June 17, 1929	Dec. 17, 1930	Burns-McKeon Co.
Haddock fillets	900	June 21, 1929	Dec. 21, 1930	Burns-McKeon Co.
Haddock fillets	120	June 24, 1929	Dec. 24, 1930	Burns-McKeon Co.
Haddock fillets	540	July 13, 1929	Jan. 13, 1931	Burns-McKeon Co.
Haddock fillets	270	July 20, 1929	Jan. 20, 1931	Burns-McKeon Co.
Haddock fillets	540	Sept. 23, 1929	Mar. 23, 1931	Burns-McKeon Co.
Haddock fillets	240	Sept. 30, 1929	Mar. 30, 1931	Burns-McKeon Co.
Haddock fillets	340	Sept. 27, 1929	Dec. 27, 1930	Harding, F. E. Co.
Haddock fillets	75	July 2, 1929	Dec. 31, 1930	O'Hara Brothers Fillet Co.
Haddock fillets	375	July 27, 1929	Sept. 30, 1930	Palmer Fish Co.
Haddock fillets	1,290	July 26, 1929	Sept. 30, 1930	Palmer Fish Co.
Haddock fillets	2,146	Aug. 22, 1929	Oct. 30, 1930	Palmer Fish Co.
Haddock fillets	500	July 2, 1929	Oct. 2, 1930	Price's Fish Market, Inc.
Haddock fillets	140	July 11, 1929	Oct. 2, 1930	Price's Fish Market, Inc.
Halibut	135	—*	Dec. 1, 1930	Atlas Fish Co.
Halibut	200	—*	Dec. 1, 1930	Atlas Fish Co.
Halibut	190	Sept. 21, 1929	Dec. 1, 1930	Atlas Fish Co.
Halibut	600	Oct. 3, 1929	Dec. 3, 1930	New England Fish Co.
Halibut	4,200	Sept. 11, 1929	Dec. 11, 1930	New England Fish Co.
Halibut	7,200	Nov. 5, 1929	Feb. 1, 1931	New England Fish Co.
Halibut	7,200	Nov. 5, 1929	Feb. 1, 1931	New England Fish Co.
Halibut	11,630	Nov. 5, 1929	Feb. 1, 1931	New England Fish Co.
Halibut	800	Sept. 18, 1929	Feb. 18, 1931	Neal, John R. Co.
Halibut	320	Oct. 10, 1929	Dec. 27, 1930	Snow & Parker, Inc.
Halibut	197	Aug. 2, 1929	Nov. 2, 1930	Whitman, Ward & Lee Co.
Halibut	268	Aug. 3, 1929	Nov. 2, 1930	Whitman, Ward & Lee Co.
Halibut	205	Aug. 16, 1929	Nov. 2, 1930	Whitman, Ward & Lee Co.
Halibut	162	Aug. 30, 1929	Nov. 2, 1930	Whitman, Ward & Lee Co.
Halibut	12,029	Oct. 13, 1929	Jan. 13, 1931	Whitman, Ward & Lee Co.
Mackerel	668	July 13, 1929	Jan. 31, 1931	Heinicke, Karl W.
Mackerel	1,320	June 5, 1929	Dec. 31, 1930	Shattuck & Jones, Inc.
Mackerel	3,378	June 7, 1929	Dec. 7, 1930	Price's Fish Market
Mackerel	1,507	June 28, 1929	Dec. 31, 1930	Smith, D. D.
Pollock fillets	2,700	Dec. 4, 1929	Feb. 27, 1931	Commonwealth Ice & Cold Storage Co.
Pollock fillets	1,800	Nov. 27, 1929	Feb. 27, 1931	Commonwealth Ice & Cold Storage Co.
Salmon	600	Oct. 12, 1929	Dec. 1, 1930	New England Fish Co.
Salmon	2,000	Nov. 5, 1929	Feb. 1, 1931	New England Fish Co.
Salmon, dressed	76	Sept. 2, 1929	Dec. 2, 1930	Atlas Fish Co.
Salmon fillets	2,040	Oct. 3, 1929	Nov. 3, 1930	New England Fish Co.
Salmon fillets (pink)	765	Sept. 4, 1929	Dec. 4, 1930	New England Fish Co.
Salmon, frozen	4,000	Sept. 2, 1929	Dec. 2, 1930	New England Fish Co.
Salmon, silver	2,320	Sept. 18, 1929	Dec. 18, 1930	Whitman, Ward & Lee Co.
Scup	1,600	June 19, 1929	Dec. 31, 1930	Busalacchi Bros.
Scup	3,025	July 30, 1929	Dec. 31, 1930	Dench & Hardy Co.
Scup	4,214	May 14, 1929	Dec. 14, 1930	Mantia's, John Sons
Scup	600	June 10, 1929	Dec. 31, 1930	Tribuna-Magri Co.
Scup	4,632	June 7, 1929	Dec. 31, 1930	Tribuna-Magri Co.
Sole, gray	2,055	June 21, 1929	Dec. 31, 1930	Coleman Son Co.
Sole, lemon	1,175	May 8, 1929	Dec. 8, 1930	Arnold & Winsor Co.
Smelts	4,375	Mar. 1, 1929	Apr. 1, 1930	Pier Fish Co.
Smelts	625	Mar. 1, 1929	Apr. 1, 1930	Pier Fish Co.
Whiting	807	June 14, 1929	Dec. 31, 1930	Tribuna-Magri Co.
Whiting, dressed	3,630	Aug. 1, 1929	Dec. 31, 1930	Busalacchi Bros.
Whiting, dressed	2,354	July 12, 1929	Dec. 30, 1930	Tribuna-Magri Co.

\*Frozen and Undated.



TABLE 11. — *Requests for Extension of Time not Granted on Goods in Cold Storage from December 1, 1929, to December 1, 1930*

ARTICLE	Weight (Pounds)	Placed in Storage	Name
Butter	504	June 13, 1929	Stone, C. H.
Egg whites	6,030	June 5, 1929	Sunbeam Egg Co.
Chickens	353	Oct. 26, 1929	Bartlett, Varney & Co.
Chickens	220	Dec. 17, 1928	Corwin, C. R. Co.
Chickens	324	Dec. 17, 1928	Corwin, C. R. Co.
Chickens	605	Dec. 17, 1928	Corwin, C. R. Co.
Chickens	5,754	Oct. 27, 1928	Hosmer, F. H. & Co.
Chickens	14,740	Oct. 27, 1928	Hosmer, F. H. & Co.
Chickens	6,096	Nov. 9, 1928	Hosmer, F. H. & Co.
Beef legs	3,404	Oct. 18, 1929	Liberty Beef Co.
Lamb	750	Apr. 13, 1929	Benjamin, A. H. Import Corp.
Butterfish	488	Aug. 10, 1929	Coleman Son Co.
Butterfish	250	Aug. 16, 1929	Coleman Son Co.
Butterfish	205	Sept. 7, 1929	Coleman Son Co.
Eels	69	Aug. 27, 1929	Russo & Sons Co.
Flats, black back	3,628	Oct. 10, 1929	Burns-McKeon Co.
Haddock fillets	210	Oct. 11, 1929	Burns-McKeon Co.
Halibut, chicken	62	June 29, 1929	Adams, J. & Co., Inc.
Salmon	2,000	Oct. 28, 1929	Pier Fish Co.
Salmon, frozen	1,530	July 15, 1929	Rowe & Sullivan

TABLE 12. — *Articles which had been in Cold Storage Longer than Twelve Months, and on which no Requests for Extensions had been made, ordered removed, from December 1, 1929, to December 1, 1930*

ARTICLE	Weight (Pounds)	Placed in Storage	Name
Butter	800	June 13, 1929	General Baking Co.
Butter	11,088	May 24, 1929	Hathaway Bakeries, Inc.
Butter	3,465	Aug. 7, 1929	Hathaway & Son
Butter	10,044	June 7, 1929	Lewis-Mears Co.
Butter	1,000	July 3, 1929	Westfield State Normal School
Eggs, mixed	3,782	Apr. 8, 1929	Keith, H. J. Co.
Egg whites	6,840	May 5, 1929	Ovson Egg Co.
Egg whites	310	Apr. 4, 1929	United Market Co.
Broilers	118	July 22, 1929	Gordon, Walter
Broilers	93	Feb. 7, 1929	Hosmer, F. H. & Co.
Broilers	54	July 23, 1929	Hosmer, F. H. & Co.
Broilers	163	July 23, 1929	Hosmer, F. H. & Co.
Broilers	39	Oct. 5, 1929	Hosmer, F. H. & Co.
Broilers	199	Oct. 5, 1929	Hosmer, F. H. & Co.
Broilers	700	Oct. 8, 1929	Hosmer, F. H. & Co.
Broilers	140	Nov. 28, 1928	Thorndike & Gerrish Co.
Broilers	250	Nov. 28, 1928	Thorndike & Gerrish Co.
Broilers	240	Dec. 5, 1928	Thorndike & Gerrish Co.
Broilers	325	Jan. 11, 1929	Wilson & Co.
Capons	134	Jan. 12, 1929	Hosmer, F. H. & Co.
Capons	172	Jan. 12, 1929	Hosmer, F. H. & Co.
Capons	1,045	Jan. 12, 1929	Hosmer, F. H. & Co.
Capons	100	Feb. 25, 1929	Springfield Provision Co.
Chickens	178	Oct. 14, 1928	Corwin, C. R. Co.
Chickens	990	Dec. 18, 1928	Corwin, C. R. Co.
Chickens	1,311	Dec. 18, 1928	Corwin, C. R. Co.
Chickens	120	Jan. 15, 1929	Corwin, C. R. Co.
Chickens	162	Jan. 12, 1929	Hosmer, F. H. & Co.
Chickens	340	Jan. 12, 1929	Hosmer, F. H. & Co.
Chickens	500	Jan. 12, 1929	Hosmer, F. H. & Co.
Chickens	445	Mar. 21, 1929	Hosmer, F. H. & Co.
Chickens	248	Apr. 3, 1929	Hosmer, F. H. & Co.
Chickens	270	Apr. 3, 1929	Hosmer, F. H. & Co.
Chickens	340	Apr. 3, 1929	Hosmer, F. H. & Co.
Chickens	978	Apr. 3, 1929	Hosmer, F. H. & Co.
Chickens	993	Apr. 3, 1929	Hosmer, F. H. & Co.
Chickens	147	Apr. 29, 1929	Hosmer, F. H. & Co.
Chickens	180	Apr. 29, 1929	Hosmer, F. H. & Co.
Chickens	235	Apr. 29, 1929	Hosmer, F. H. & Co.
Chickens	305	Apr. 29, 1929	Hosmer, F. H. & Co.
Chickens	624	Aug. 17, 1929	Hosmer, F. H. & Co.
Chickens	800	Sept. 21, 1929	Hosmer, F. H. & Co.
Chickens	501	Oct. 4, 1929	Hosmer, F. H. & Co.
Chickens	1,144	Oct. 28, 1929	Hosmer, F. H. & Co.
Chickens	130	Jan. 12, 1930	Hosmer, F. H. & Co.
Chickens	250	Jan. 12, 1930	Hosmer, F. H. & Co.
Chickens	400	Nov. 21, 1928	Thorndike & Gerrish Co.
Chickens, guinea	25	June 20, 1929	Hosmer, F. H. & Co.
Ducks	288	Feb. 12, 1929	Fitzpatrick Brothers
Ducks	170	Aug. 7, 1929	Hosmer, F. H. & Co.
Fowl	720	Sept. 20, 1929	Armour and Co.
Fowl	179	Oct. 31, 1929	Childs, Sleeper Co.
Fowl	250	June 25, 1929	Hosmer, F. H. & Co.
Fowl	306	June 27, 1929	Hosmer, F. H. & Co.
Fowl	336	June 27, 1929	Hosmer, F. H. & Co.
Fowl	159	June 29, 1929	Hosmer, F. H. & Co.

TABLE 12. — *Articles which had been in Cold Storage Longer than Twelve Months, and on which no Requests for Extensions had been made, ordered removed, from December 1, 1929, to December 1, 1930 — Continued*

ARTICLE	Weight (Pounds)	Placed Storage	Name
Fowl . . . . .	268	June 29, 1929	Hosmer, F. H. & Co.
Fowl . . . . .	352	June 29, 1929	Hosmer, F. H. & Co.
Fowl . . . . .	496	June 29, 1929	Hosmer, F. H. & Co.
Fowl . . . . .	220	July 9, 1929	Hosmer, F. H. & Co.
Fowl . . . . .	825	July 9, 1929	Hosmer, F. H. & Co.
Fowl . . . . .	236	Oct. 15, 1929	Omaha Cold Storage Co.
Fowl . . . . .	360	Oct. 15, 1929	Omaha Cold Storage Co.
Fowl . . . . .	525	Oct. 15, 1929	Omaha Cold Storage Co.
Fowl . . . . .	400	Oct. 15, 1929	Omaha Cold Storage Co.
Fryers . . . . .	196	July 6, 1929	Hosmer, F. H. & Co.
Pigeons . . . . .	1,225	May 31, 1929	Hosmer, F. H. & Co.
Pigeons . . . . .	680	July 6, 1929	Hosmer, F. H. & Co.
Poultry . . . . .	100	— *	Alpert, Samuel
Poultry . . . . .	40	Dec. 3, 1928	Bean, J. W.
Poultry . . . . .	26	Nov. 19, 1928	Hosmer, F. H. & Co.
Poultry . . . . .	62	Nov. 19, 1928	Hosmer, F. H. & Co.
Poultry . . . . .	308	Nov. 19, 1928	Hosmer, F. H. & Co.
Poultry . . . . .	350	Nov. 19, 1928	Hosmer, F. H. & Co.
Poultry . . . . .	1,003	Nov. 19, 1928	Hosmer, F. H. & Co.
Poultry . . . . .	37	July 3, 1929	Hosmer, F. H. & Co.
Poultry . . . . .	151	July 3, 1929	Hosmer, F. H. & Co.
Roasters . . . . .	1,418	Mar. 7, 1929	Armour and Co.
Roasters . . . . .	770	June 3, 1929	Armour and Co.
Roasters . . . . .	474	Jan. 8, 1929	Quinn, Peter F. & Sons
Roasters . . . . .	298	Dec. 3, 1928	Thorndike & Gerrish Co.
Squab . . . . .	110	Jan. 18, 1929	Glickman & Co., M.
Squab . . . . .	22	Sept. 23, 1929	Hicks & Shaw
Squab . . . . .	9	Feb. 27, 1929	Holmes, Samuel, Inc.
Turkeys . . . . .	1,260	Feb. 9, 1929	Armour and Co.
Turkeys . . . . .	2,062	May 31, 1929	Armour and Co.
Turkeys . . . . .	1,100	Jan. 2, 1930	Armour and Co.
Turkeys . . . . .	125	Jan. 25, 1929	Davidson, J. J.
Turkeys . . . . .	154	Jan. 2, 1929	Hosmer, F. H. & Co.
Turkeys . . . . .	454	Jan. 4, 1929	Hosmer, F. H. & Co.
Turkeys . . . . .	472	Jan. 12, 1929	Hosmer, F. H. & Co.
Turkeys . . . . .	3,000	Mar. 2, 1929	Hosmer, F. H. & Co.
Turkeys . . . . .	2,675	Oct. 9, 1929	Hosmer, F. H. & Co.
Turkeys . . . . .	42	Dec. 10, 1928	Rudd's Market
Stags . . . . .	413	July 26, 1929	Hosmer, F. H. & Co.
Venison . . . . .	25	Dec. 20, 1928	Barker, Charles A.
Beef . . . . .	40,460	June 22, 1929	Brighton Dressed Meat Co.
Beef loins . . . . .	440	Oct. 31, 1929	Childs, Sleeper Co.
Beef rattle . . . . .	118	July 15, 1929	United Kosher Butchers' Assn.
Beef (Spencer Rolls) . . . . .	212	Oct. 1, 1929	Rounsvelle, P. W. Co.
Lamb . . . . .	204	May 28, 1929	Crafts, A. A.
Lamb . . . . .	188	Apr. 20, 1929	Fellows & Gamage Co.
Lamb . . . . .	200	Sept. 27, 1929	Glickman, M. & Co.
Lamb . . . . .	73	June 4, 1929	Stolar, R.
Lamb fores . . . . .	108	June 25, 1929	Glickman, M. & Co.
Lamb legs . . . . .	154	July 6, 1929	Stolar, R.
Lamb rax . . . . .	735	Aug. 17, 1929	Waldorf System, Inc.
Yearlings . . . . .	164	Aug. 24, 1929	Batchelder, Snyder, Dorr & Doe Co.
Pork . . . . .	90	Dec. 3, 1928	Bowen, J. W.
Pork livers . . . . .	936	Apr. 2, 1929	Baldau, F. H. & Co.
Pork loins . . . . .	972	Jan. 2, 1929	United Beef Co.
Pork loins . . . . .	16,020	Jan. 4, 1929	Waldorf System, Inc.
Pork tenderloins . . . . .	83	Dec. 5, 1928	Ginter Restaurant
Sausage . . . . .	10	Aug. 15, 1929	Levine, Morris E.
Catfish . . . . .	120	May 2, 1929	Atlas Fish Co.
Cod steak . . . . .	165	Oct. 11, 1929	Atlas Fish Co.
Cod steak . . . . .	589	Aug. 1, 1929	Cape Fish Co.
Devil fish . . . . .	167	July 30, 1929	Tribuna-Magri Co.
Eels . . . . .	200	July 16, 1929	Rowe & Sullivan
Eels . . . . .	460	Oct. 17, 1929	Tocco, Joe
Eels, sand . . . . .	350	Oct. 15, 1929	Tribuna-Magri Co.
Eels, sand . . . . .	1,425	Oct. 21, 1929	Tribuna-Magri Co.
Eels, sand . . . . .	1,675	Oct. 24, 1929	Tribuna-Magri Co.
Eels, sand . . . . .	3,628	Oct. 10, 1929	Burns-McKeon Co.
Flats, black back . . . . .	210	Oct. 11, 1929	Burns-McKeon Co.
Haddock fillets . . . . .	240	Aug. 16, 1929	Harding, F. E.
Haddock fillets . . . . .	225	Nov. 8, 1929	Harding, F. E.
Haddock fillets . . . . .	780	Sept. 27, 1929	Palmer Fish Co.
Haddock fillets . . . . .	22 boxes	May 16, 1929	Shore Fish Co.
Hake fillets . . . . .	2,100	Oct. 17, 1929	Boston Bay Fillet Co.
Halibut . . . . .	200	Oct. 12, 1929	New England Fish Co.
Halibut . . . . .	275	Nov. 29, 1928	Ward Fisheries, Inc.
Halibut . . . . .	787	Oct. 11, 1929	Whitman, Ward & Lee
Lobster . . . . .	200	June 14, 1929	Brooks & Sprague
Lobster . . . . .	225	June 17, 1929	Brooks & Sprague
Lobster . . . . .	195	June 22, 1929	Brooks & Sprague
Lobster . . . . .	1,500	June 27, 1929	Brooks & Sprague
Mackerel . . . . .	901	Aug. 15, 1929	Gloucester Fresh Fish Co.

\*Original date unknown.

TABLE 12—Articles which had been in Cold Storage Longer than Twelve Months, and on which no Requests for Extensions had been made, ordered removed, from December 1, 1929, to December 1, 1930—Concluded

Mackerel . . . . .	567	July 15, 1929	Hutchinson, W. K.
Mackerel . . . . .	940	Aug. 9, 1929	Phillips, B. F.
Mackerel . . . . .	300	Nov. 29, 1928	Ward Fisheries, Inc.
Mackerel . . . . .	120	Dec. 13, 1928	Ward Fisheries, Inc.
Monk fish . . . . .	254	Oct. 16, 1929	Tribuna-Magri Co.
Pollock . . . . .	762	Sept. 28, 1930	Phillips, B. F. Co.
Pollock fillets . . . . .	165	Oct. 31, 1929	Best Fish Co.
Salmon . . . . .	114	June 22, 1929	Hutchinson, W. K.
Sardine herring . . . . .	750	Nov. 16, 1928	Viltero, H.
Scallops . . . . .	110	Oct. 10, 1929	Atlas Fish Co.
Scup . . . . .	610	June 15, 1929	Rhode Island Fish Co.
Scup . . . . .	600	May 15, 1929	Tribuna-Magri Co.
Skate wings . . . . .	300	Oct. 2, 1929	Tribuna-Magri Co.
Smelts . . . . .	45	Oct. 10, 1929	Atlas Fish Co.
Smelts . . . . .	25	Dec. 6, 1928	Great Atlantic & Pacific Tea Co., The
Smelts . . . . .	75	Nov. 29, 1928	Ward Fisheries, Inc.
Sole, gray . . . . .	1,570	Oct. 11, 1929	Whitman, Ward & Lee
Sole, lemon . . . . .	160	June 1, 1929	Rush Fish Co.
Squid, bone . . . . .	120	June 1, 1929	Pennisi, G.
Swordfish . . . . .	330	July 24, 1929	Byron, James



TABLE 13. — *Articles Other than Fish placed in Cold Storage from December 1, 1929, to December 1, 1930*

	Butter (lbs.)	Eggs (Dozens)	Broken- out Eggs (lbs.)	Broilers (lbs.)	Roasters (lbs.)	Fowls (lbs.)	Turkeys (lbs.)	Miscel- aneous Poultry (lbs.)	Beef (lbs.)	Pork (lbs.)	Lamb and Mutton (lbs.)	Miscel- aneous Meats (lbs.)
December	547,231	311,430	515,515	74,482	1,320,183	210,103	832,091	492,925	403,691	4,755,510	159,371	2,444,690
January	628,110	182,130	312,730	88,011½	1,072,514	329,365	412,423	408,955	305,159	3,339,093	60,747	2,301,243
February	503,253	148,500	367,530	49,521	324,198	252,092	251,932½	303,811	191,774	2,568,738½	274,525	2,189,667
March	578,718	2,389,860	672,571	48,006	474,197	114,957	177,615	202,826	535,757	1,997,040	110,798	1,820,086
April	591,161	3,684,980	1,248,011	59,580	323,261	56,231	177,570½	221,994	537,911	1,967,326	225,120½	1,561,801½
May	3,886,542	3,370,470	1,169,396	55,407	238,214	83,037	123,560	531,300½	522,203	1,185,958½	49,420	1,419,934
June	6,232,761	1,601,580	857,029	275,753	279,134	279,134	201,901	612,919	780,036	2,522,832½	293,070½	1,643,135
July	6,324,566	1,117,020	461,461	171,557	189,776	118,576	89,912	466,375½	1,314,221½	1,923,798½	219,083½	1,618,352
August	3,772,142	428,670	404,270	169,319	174,755	112,755	89,912	295,813	651,203	997,411	92,167	1,633,107½
September	1,776,792	621,990	336,155	200,752	155,605	123,384	34,900	222,016	435,457	1,029,147½	101,749	1,651,774
October	1,120,084	217,770	274,627	215,955	367,266	112,287	28,608	161,902	399,356	606,668	124,285	950,116
November	686,274	337,710	823,011	103,052	612,931	299,255	212,353	212,310	749,572	876,031	281,059	1,553,525

TABLE 14. — *Fish placed in Cold Storage from December 15, 1929, to December 15, 1930*

	Bluefish (lbs.)	Butter- fish (lbs.)	Ciscoes (lbs.)	Cod, Hake, Pollock, and Haddock (lbs.)	Halibut (lbs.)	Herring (lbs.)	Mackerel (lbs.)	Fall and Silver Salmon (lbs.)	Salmon, all Others (lbs.)	Shad (lbs.)	Smelts, Eula- chon, etc. (lbs.)	Squid (lbs.)	White- fish (lbs.)	Whiting (lbs.)	Miscel- aneous Frozen Fish (lbs.)
January	2,161	11,680	14,415	1,008,698	208,819	178,615	207,577	62,650	7,865	—	81,183	35,745	13,942	357,213	364,626
February	454	7,233	—	533,212	188,818	112,025	133,003	44,725	2,400	15	48,284	19,248	—	46,610	242,961
March	190	15,271	—	520,153	81,794	151,182	117,823	57,175	623	157	169,010	30,309	8,000	243,568	336,457
April	—	—	3,250	464,725	91,553	82,305	115,137	36,939	2,020	150	670	36,529	3,290	—	208,356
May	—	16,710	567	1,699,338	70,065	885,616	71,008	3,737	100	1,092	6,434	1,657,855	—	—	527,500
June	2,516	69,656	—	1,013,368	34,799	494,479	1,717,491	5,640	31,099	335	6,307	1,359,551	300	3,380,791	508,521
July	3,139	31,065	3,700	1,583,651	52,801	121,020	3,887,484	905	48,752	11,130	637	275,318	1,940	3,551,119	1,142,388
August	14,079	51,789	1,950	2,208,709	20,352	168,507	1,598,500	6,778	13,948	59,800	290	393,889	3,600	3,752,214	1,544,810
September	4,824	26,643	2,825	1,866,785	21,932	308,680	231,501	860	11,198	117,800	150	320,046	159	152,011	1,626,579
October	13,235	20,944	14,500	1,274,337	23,238	414,841	451,749	18,624	7,743	200	4,911	5,962	—	47,085	743,962
November	3,021	23,235	2,400	402,222	272,471	348,721	16,607	91,905	47,711	—	4,029	7,705	4,169	319,156	572,775
December	229	2,946	—	435,301	175,292	301,710	11,228	44,927	42,325	1,000	29,061	8,995	6,629	81,289	393,093

TABLE 15. — *Articles Other than Fish on Hand in Cold Storage on the First Day of the Month, from January 1, 1930, through December 1, 1930*

	Butter (lbs.)	Eggs (Dozens)	Broken- out Eggs (lbs.)	Broilers (lbs.)	Roasters (lbs.)	Fowls (lbs.)	Turkeys (lbs.)	Miscel- laneous Poultry (lbs.)	Beef (lbs.)	Pork (lbs.)	Lamb and Mutton (lbs.)	Miscel- laneous Meats (lbs.)
January	6,665,349	1,253,370	1,487,039	1,089,791	3,779,651	879,391	1,109,710	1,543,777	2,353,092	5,613,591	707,203	3,598,761
February	4,608,781	212,160	1,111,158	1,060,196	4,506,651	1,013,419	1,160,055	1,571,178	2,136,890	7,278,511	462,622	3,001,990
March	3,146,055	22,080	793,126	956,087	4,257,746	1,090,041	1,107,456	1,479,752	1,951,781	8,469,858	462,622	3,943,532
April	1,878,995	2,207,385	861,388	781,613	3,778,538	820,578	991,931	1,108,455	2,197,845	7,559,453	635,481	3,767,944
May	1,285,437	5,579,970	1,585,631	602,715	2,967,247	427,669	777,170	937,322	2,357,891	6,079,469	813,693	3,307,855
June	4,011,417	8,718,000	2,258,411	447,963	2,280,958	293,615	678,047	1,102,434	2,421,939	5,000,162	788,819	3,510,677
July	9,534,334	10,059,240	2,587,651	360,825	1,800,322	425,387	685,872	1,410,693	2,676,179	4,590,617	880,989	3,457,800
August	12,845,099	10,360,770	2,458,651	349,247	1,298,658	327,503	575,897	1,562,569	3,157,848	4,009,534	899,532	3,185,999
September	12,549,357	9,162,980	2,266,915	408,144	593,070	228,319	377,636	1,553,719	2,933,562	2,517,495	777,196	2,689,761
October	11,610,398	7,739,880	1,990,056	520,082	368,833	178,783	244,372	1,565,615	2,726,280	1,807,286	761,463	2,680,363
November	9,687,850	5,303,295	1,658,295	615,564	532,337	186,796	106,427	1,461,779	2,518,781	1,077,555	763,437	1,916,762
December	7,321,145	2,893,380	1,926,710	644,615	1,045,705	412,408	161,652	1,237,293	2,888,607	1,142,714	829,524	2,328,117

TABLE 16. — *Fish on Hand in Cold Storage on the Fifteenth Day of the Month, from January 15, 1930, through December 15, 1930*

	Bluefish (lbs.)	Butter- fish (lbs.)	Ciscoes (lbs.)	Cod, Hake, Pollock, and Haddock (lbs.)	Halibut (lbs.)	Herring (lbs.)	Mackerel (lbs.)	Fall and Silver Salmon (lbs.)	Salmon, all Others (lbs.)	Shad (lbs.)	Smelts, Eula- chon, etc. (lbs.)	Squid (lbs.)	White- fish (lbs.)	Whiting (lbs.)	Miscel- laneous Frozen Fish (lbs.)
January	5,929	301,279	14,799	1,526,475	535,053	440,682	3,282,040	218,475	44,021	60,019	71,479	974,986	16,828	3,291,936	2,796,643
February	5,069	200,339	1,355	1,245,693	395,905	243,986	2,096,664	175,627	35,035	41,317	70,339	461,792	7,810	2,844,821	2,106,397
March	3,835	115,580	425	1,039,448	127,360	115,284	1,189,146	129,861	20,450	18,327	197,555	123,936	8,779	1,288,873	1,500,797
April	2,780	21,934	3,250	580,045	137,838	29,363	150,156	71,601	13,645	1,942	87,040	22,214	1,358	400,278	1,002,676
May	780	23,935	2,337	1,589,531	184,687	658,294	85,571	29,164	11,511	2,559	64,336	1,658,673	618	239,320	1,132,511
June	5,139	84,530	611	2,033,623	208,988	872,000	1,774,735	21,153	41,311	2,600	62,394	2,891,868	918	3,503,548	1,327,842
July	5,737	115,225	3,747	2,429,697	258,168	730,272	5,610,700	18,743	74,080	11,290	62,294	3,047,596	2,858	6,963,324	2,309,408
August	17,843	164,812	4,787	3,639,366	268,745	473,348	7,103,294	24,201	82,648	10,596	61,271	3,175,490	3,218	7,078,547	3,485,115
September	20,127	188,245	1,464	3,915,631	280,417	688,104	7,089,987	23,253	87,492	140,623	59,862	3,108,157	3,377	6,802,805	4,677,676
October	31,339	205,963	14,379	8,810,812	283,990	990,697	8,066,796	41,489	93,920	135,705	59,696	3,644,789	6,377	6,578,677	4,770,511
November	26,698	217,483	14,434	3,038,555	522,961	1,175,650	5,329,461	129,303	126,217	73,132	52,980	2,320,205	7,101	6,358,931	3,990,122
December	19,835	184,230	11,164	2,518,202	502,535	1,278,900	4,297,911	132,063	145,472	66,225	51,601	1,973,111	7,771	5,789,955	3,656,109

TABLE 17. — *Confiscations*

## In stores:

Chickens . . . . .	58 lbs.	Bologna . . . . .	2 lbs.
Turkeys . . . . .	207 "	Frankforts . . . . .	10 "
Poultry . . . . .	75 "	Hamburg . . . . .	7 "
Beef . . . . .	210 "	Liverwurst . . . . .	15 "
Lamb . . . . .	52 "	Pork liver . . . . .	2 "
Pork . . . . .	80 "	Pork sausage . . . . .	20 "
Pork loins . . . . .	50 "	Sausage meat . . . . .	20 "
Meat products . . . . .	25 "	Olives . . . . .	10 "
Bacon . . . . .	25 "		

## In Cold Storage Warehouses:

Chickens . . . . .	30 "	Miscellaneous poultry . . . . .	55 "
Ducks . . . . .	25 "	Beef livers . . . . .	25 "
Fowl . . . . .	496 "	Hog lips . . . . .	50 "
Roosters . . . . .	190 "	Sausage meat and veal . . . . .	200 "

## In Slaughterhouses:

Beef . . . . .	300 "
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## REPORT OF THE DIVISION OF SANITARY ENGINEERING

A. D. WESTON, *Director and Chief Engineer*  
OVERSIGHT AND CARE OF INLAND WATERS

*Water Supply and Sewerage*

During the year 1930, 574 applications for advice were received, this number being by far the largest ever received by the Department in any one year and representing an increase of about 20% over the year 1929. Of these applications 445 related to water supplies, 39 to sewerage, 17 to pollution of streams, 5 to sources of ice supply, and 68 to miscellaneous matters.

The rainfall for the year 1930 throughout the State as a whole was 10.78 inches below the normal, being less than the normal in each month except October and November. This condition following that prevailing during the last 7 months of 1929 brought the total deficiency of rainfall to 17.20 inches below the normal for the 19 months ending December 31, 1930. Deficiencies of more than one inch occurred in the months of January, February, April, August, September, and December and in September the average rainfall was 2.40 inches less than the normal. As a result of the low rainfall many public and private sources of water supply throughout the State became depleted. It was necessary in some communities to carry water from sources oftentimes quite remote. The practice of carrying water in this manner is an unsatisfactory one at best as it may easily result in pollution. Several communities not supplied with water from public works caused investigations to be made with a view of establishing public water supplies which will probably result in legislation giving authority to establish municipal water supplies or fire and water districts in the towns of Burlington, Hanson, Pembroke, Easton and Raynham.

During the year new water supplies were introduced into the towns of Hanover, Southborough and Southwick. The total number of cities and towns supplied with water from public works at the end of the year 1930 was <sup>3</sup> 236 out of the total of 355 cities and towns in the State. The total population of the State by the census of 1930 was 4,249,614 of which 4,122,173, or about 97%, were included in cities and towns having public water supplies in the whole or in part of their territory. There still remain eight towns having in 1930 populations in excess of 2,500 which are not provided with public water supplies. These towns are the following:

<sup>1</sup> Tewksbury . . . . .	5,585	Swansea . . . . .	3,941
Templeton . . . . .	4,159	Bellingham . . . . .	3,189
Westport . . . . .	4,408	<sup>2</sup> Dighton . . . . .	3,147
Seekonk . . . . .	4,762	Rehoboth . . . . .	2,610

*Examination of Camps*

Examinations were made during the year 1930 of about 163 camps of which some 68 were privately owned, 16 operated by the Boy Scouts, 17 by the Girl Scouts, 15 by the Y. M. C. A. and Y. W. C. A., 3 by the Camp Fire Girls, 15 by churches and religious orders, while 11 were maintained as health camps and some 18 others were operated by organizations of various types. In general conditions affecting water supply and sewage disposal at these camps were more satisfactory than those found at the time of the previous examination made by this Department in the year 1926.

*Investigation of Boston Harbor*

In accordance with the provisions of Chapter 29 of the Resolves of 1929, an investigation was made during 1929 and 1930 of the discharge of sewage into Boston Harbor by a joint commission consisting of a representative of the Department of Public Works, a representative of the Department of Public Health, a representative of the Metropolitan District Commission, the Health Commissioner of the city of Boston and the Commissioner of Public Works of the city of Boston. This investigation was completed during the year 1930, and a report was made to the Legislature of 1931 in Senate Document No. 56 of that year.

<sup>1</sup> Population includes the inmates and employees of public institutions supplied with water from private sources.

<sup>2</sup> Small part of North Dighton supplied with water from Taunton.

<sup>3</sup> Includes several smaller towns supplied only in part by water companies, industrial plants, or from other towns.

*Investigation Relative to the Advisability of Developing Certain Sections of the Mystic and Malden Rivers for Recreational and Other Uses*

A joint investigation by this Department and the Metropolitan District Commission as authorized by Chapter 22 of the Resolves of 1930 of the beds, shores and waters of the Mystic and Malden rivers and the marshes adjacent thereto to determine the best means of improving the same for recreational and other uses was begun early in the summer of this year.

*Examination of the Coastal Waters of Barnstable, Dukes and Nantucket Counties*

An examination of portions of the coastal waters of Barnstable, Dukes and Nantucket Counties has been made during the year and these investigations will be made from time to time during the year 1931 so far as practicable with funds made available under the act of the year 1929.

SANITARY PROTECTION OF PUBLIC WATER SUPPLIES

At the request of the water department of the city of Gloucester, rules and regulations for the protection of the sources of water supply for that city were adopted by this Department to include the new Babson Reservoir on Alewife Brook, the construction of this reservoir having been finished during the latter part of the year 1930.

Rules and regulations were again adopted for the protection of the sources of water supply of the town of Falmouth, there having been some question of the legality of the publication of the rules and regulations adopted by this Department in 1906. The rules and regulations adopted by the Department in 1902 for the protection of the sources of water supply of the city of Taunton were amended during the year to include the river leading from Long Pond.

Cities, towns, and fire and water districts for which rules and regulations have now been adopted, in accordance with Section 160 of Chapter 111 of the General Laws, are as follows:

Abington and Rockland	Greenfield	Northampton
Adams (Fire District)	Haverhill	North Andover
Amherst (Water Com- pany)	Hingham and Hull (Water Company)	Northborough
Andover	Holden	Norwood
Ashburnham	Holyoke	Peabody
Ashfield (Water Com- pany)	Hudson	Pittsfield
Attleboro	Lakeville	Plymouth
Braintree	(State Sanatorium)	Randolph and Holbrook
Brockton and Whitman	Lee (Berkshire Water Co.)	Rockport
Cambridge	Leicester (Cherry Valley and Rochdale Water District)	Russell
Chester (Fire District)	Leominster	Rutland
Chicopee	Lincoln and Concord	Salem and Beverly
Cohasset (Water Com- pany)	Lynn	Scituate (Water Com- pany)
Concord	Marlborough	Springfield
Dalton (Fire District)	Maynard	Stockbridge (Water Com- pany)
Danvers and Middleton	Medfield (State Hospital)	Taunton
Easthampton	Metropolitan Water Dis- trict	Wakefield
Fall River	Milford (Water Company)	Westborough
Falmouth	Montague (Turners Falls Fire District)	Westfield
Fitchburg	Newburyport	West Springfield
Gardner	Norfolk (State Hospital)	Weymouth
Gloucester		Williamsburg
Great Barrington		Winchester
(Housatonic Water Works Company)		Worcester

## EXAMINATION OF PUBLIC WATER SUPPLIES

The usual examinations of the public water supplies have been carried on during the year and many of the sources have been inspected by engineers of the Division. The waters of the various sources have been analyzed chemically and microscopically, the latter in the case of surface waters; and bacterial examinations of these waters have been made whenever practicable. In only a very few cases have emergency water supplies been found necessary, but where introduced samples of the water were collected by this Department and the water supplied was chlorinated under the supervision of the water departments.

The following are the average results of chemical analyses of the sources of public water supply examined in 1930:

*Analyses of the Water of Public Water Supplies*  
*Averages of Chemical Analyses of Surface-Water Sources for the Year 1930*  
 [Parts in 100,000]

CITY OR TOWN	Source	Color	Residue on Evaporation	AMMONIA			Chlorine	Hardness
				Free	ALBUMINOID	Sus-pended		
Metropolitan Water District	Wachusett Reservoir, upper end	.25	4.75	.0024	.0114	.0033	.30	1.4
	Wachusett Reservoir, lower end	.06	3.63	.0014	.0078	.0020	.28	1.2
	Sudbury Reservoir	.09	3.61	.0013	.0083	.0025	.31	1.3
	Framingham Reservoir No. 3	.10	3.88	.0013	.0104	.0031	.30	1.4
	Hopkinton Reservoir	.25	3.85	.0012	.0117	.0027	.31	1.0
	Ashland Reservoir	.27	4.70	.0013	.0115	.0026	.44	1.4
	Framingham Reservoir No. 2	.32	6.88	.0026	.0166	.0041	.72	2.0
	Lake Cochituate	.08	7.55	.0030	.0125	.0029	.90	3.0
	Chestnut Hill Reservoir	.09	4.07	.0016	.0088	.0021	.35	1.4
	Weston Reservoir	.08	3.83	.0016	.0084	.0024	.30	1.4
	Spot Pond	.08	4.16	.0013	.0082	.0021	.31	1.4
	Tap in State House	.10	4.05	.0012	.0074	.0019	.32	1.3
	Tap in Revere	.07	3.55	.0007	.0066	.0014	.29	1.4
	Tap in Quincy	.07	4.25	.0007	.0067	.0020	.34	1.6
	Big Sandy Pond	.02	3.78	.0022	.0104	.0027	.75	0.5
	Dry Brook	.20	6.82	.0014	.0068	.0015	.14	4.0
	Basset Brook	.02	5.06	.0018	.0032	.0011	.14	2.9
	Amethyst Brook large reservoir	.40	4.52	.0013	.0095	.0023	.19	0.7
	Amethyst Brook small reservoir	.14	4.24	.0036	.0137	.0045	.22	1.0
Andover	Haggett's Pond	.05	4.63	.0015	.0115	.0020	.47	1.6
Ashburnham	Upper Naukeag Lake	.01	3.18	.0012	.0021	.0006	.17	0.7
Ashfield	Bear Swamp Brook	.20	5.70	.0009	.0070	.0020	.15	3.2
Athol	Phillipston Reservoir	.32	4.18	.0008	.0189	.0060	.20	1.1
	Buckman Brook Reservoir	.17	4.18	.0021	.0107	.0025	.18	1.0
	Thousand Acre Meadow Brook	1.03	6.22	.0041	.0198	.0041	.25	1.7
	Inlet of filter	.34	4.76	.0027	.0123	.0034	.19	1.4
Barre	Outlet of filter	.21	4.38	.0012	.0089	.0018	.16	1.2
Blackstone	Reservoir	.04	4.45	.0010	.0093	.0033	.20	1.5
Blandford (Fire Dist.)	Tap (supply from Woonsocket, R. I.)	.14	5.15	.0004	.0084	.0012	.21	1.7
	Freeland Brook	.04	3.42	.0004	.0024	.0009	.23	1.0
BROCKTON	Silver Lake	.06	3.94	.0009	.0092	.0031	.59	0.6
Brookfield	Cooley Hill Reservoir	.03	4.79	.0039	.0159	.0050	.28	1.1
CAMBRIDGE	Lower Hobbs Brook Reservoir	.08	5.80	.0046	.0157	.0029	.52	2.5
	Upper Hobbs Brook Reservoir	.20	6.70	.0035	.0181	.0037	.50	2.6
	Stony Brook Reservoir	.24	7.13	.0040	.0147	.0038	.62	3.0
	Fresh Pond	.07	9.22	.0102	.0148	.0033	.77	4.5
Cheshire	Thunder Brook	.03	7.08	.0024	.0023	.0006	.14	5.3
Chester (Fire District)	Kitchen Brook	.01	6.75	.0034	.0027	.0009	.11	4.5
	Austin Brook Reservoir	.09	4.38	.0008	.0084	.0014	.17	1.7
	Horn Pond	.08	4.47	.0014	.0118	.0025	.16	1.7
CHICOPEE	Morton Brook	.05	5.43	.0021	.0028	.0009	.34	1.7
	Cooley Brook	.21	4.49	.0087	.0163	.0068	.25	1.5
	Tap in town	.06	3.39	.0018	.0083	.0019	.24	1.3
Clinton	McClellan Reservoir	.03	7.80	.0023	.0046	.0023	.15	4.7
Colrain (Griswoldville)	Mountain Brook Reservoir	.03	8.72	.0007	.0031	.0008	.15	5.9
Concord	Nagog Pond	.05	3.81	.0031	.0102	.0038	.42	0.7
Dalton (Fire District)	Egypt Brook Reservoir	.18	3.53	.0011	.0054	.0014	.13	1.1
	Windsor Reservoir	.28	4.95	.0062	.0117	.0023	.14	2.4
	Cady Brook	.23	5.31	.0011	.0066	.0012	.15	2.7
	Middleton Pond	.26	4.63	.0167	.0201	.0068	.48	1.8
Danvers	Swan Pond	.18	5.43	.0035	.0152	.0029	.42	1.9
Deerfield (South Deerfield Water Supply District)	Roaring Brook	.04	6.77	.0004	.0024	.0006	.16	3.9
Egremont (South)	Goodale Brook	.01	4.77	.0003	.0013	.0004	.13	2.5



## Averages of Chemical Analyses of Surface-Water Sources, etc. — Continued

[Parts in 100,000]

CITY OR TOWN	Source	Color	Residue on Evaporation	AMMONIA			Chlorine	Hardness
				Free	ALBUMINOID			
					Total	Sus-pended		
FALL RIVER . . .	North Watuppa Lake . . .	.03	3.80	.0011	.0083	.0022	.51	0.6
Falmouth . . .	Long Pond . . .	.00	3.94	.0012	.0063	.0018	1.05	0.5
FITCHBURG . . .	Meetinghouse Pond . . .	.03	3.25	.0050	.0103	.0024	.22	0.8
	Scott Reservoir . . .	.04	3.64	.0063	.0132	.0051	.23	0.7
	Wachusett Lake . . .	.05	3.22	.0054	.0084	.0020	.21	0.7
	Falulah Brook . . .	.11	3.50	.0048	.0080	.0016	.21	0.7
	Ashby Reservoir . . .	.18	3.32	.0090	.0152	.0037	.20	0.6
GARDNER . . .	Crystal Lake . . .	.07	4.76	.0012	.0099	.0018	.34	2.0
GLOUCESTER . . .	Dike's Brook Reservoir . . .	.39	4.92	.0042	.0121	.0040	.83	0.7
	Wallace Reservoir . . .	.24	4.90	.0032	.0107	.0036	.97	0.8
	Haskell Brook Reservoir . . .	.14	4.45	.0039	.0059	.0016	.77	0.6
Great Barrington (Fire District) . . .	East Mountain Reservoir . . .	.06	6.01	.0090	.0109	.0038	.13	3.4
Great Barrington (Housatonic) . . .	Long Pond . . .	.05	7.66	.0052	.0144	.0024	.14	6.0
Greenfield . . .	Glen Brook Upper Reservoir . . .	.02	6.87	.0028	.0098	.0020	.31	4.0
	Glen Brook Lower Reservoir . . .	.03	6.23	.0025	.0060	.0019	.22	3.7
Hadley (Water Supply District) . . .	Hart's Brook Reservoir . . .	.05	4.70	.0009	.0044	.0007	.20	1.8
Hatfield . . .	Running Gutter Brook Reservoir . . .	.07	7.35	.0005	.0019	.0005	.22	2.7
HAVERHILL . . .	Johnson's Pond . . .	.09	5.94	.0020	.0124	.0021	.46	2.6
	Crystal Lake . . .	.08	3.70	.0013	.0108	.0021	.34	1.4
	Kenoza Lake . . .	.09	5.08	.0024	.0117	.0030	.44	2.3
	Lake Saltonstall . . .	.05	6.68	.0011	.0129	.0030	.64	2.8
	Pentucket Lake . . .	.04	4.73	.0034	.0104	.0020	.41	2.0
	Millvale Reservoir . . .	.37	6.27	.0025	.0123	.0025	.42	2.3
Hingham . . .	Accord Pond . . .	.13	3.53	.0029	.0090	.0026	.59	0.7
	Fulling Mill Pond . . .	.30	6.13	.0046	.0168	.0056	.77	1.8
Hinsdale (Fire District) . . .	Reservoir . . .	.05	3.98	.0011	.0062	.0016	.15	0.4
HOLYOKE . . .	Whiting Street Reservoir . . .	.05	5.43	.0028	.0096	.0021	.23	3.0
	Fomer Reservoir . . .	.21	3.91	.0035	.0106	.0026	.18	1.3
	Wright and Ashley Pond . . .	.06	4.66	.0026	.0091	.0019	.18	2.2
	High Service Reservoir . . .	.05	4.20	.0021	.0107	.0028	.18	1.7
	White Reservoir . . .	.12	3.92	.0039	.0137	.0048	.17	1.7
Hudson . . .	Gates Pond . . .	.05	3.38	.0024	.0112	.0040	.28	1.4
Huntington (Fire District) . . .	Cold Brook Reservoir . . .	.15	4.28	.0009	.0053	.0011	.17	1.1
Ipswich . . .	Dow's Brook Reservoir . . .	.18	6.54	.0029	.0143	.0043	.61	2.1
	Bull Brook . . .	1.01	8.39	.0042	.0188	.0032	.68	2.6
LAWRENCE . . .	Merrimack River, filtered . . .	.34	6.34	.0101	.0106	-	.67	2.0
Lee . . .	Codding Brook Upper Reservoir . . .	.05	4.53	.0009	.0029	.0007	.15	2.8
	Codding Brook Lower Reservoir . . .	.02	5.28	.0009	.0031	.0011	.15	2.8
	Basin Pond Brook . . .	.35	4.95	.0009	.0103	.0023	.14	1.7
Lenox . . .	Lower Root Reservoir . . .	.04	6.92	.0014	.0041	.0012	.14	4.9
LEOMINSTER . . .	Woolsey Reservoir . . .	.02	6.49	.0019	.0025	.0009	.13	4.0
	Morse Reservoir . . .	.05	3.16	.0042	.0091	.0022	.19	0.5
	Haynes Reservoir . . .	.09	3.20	.0020	.0137	.0026	.21	0.7
	Fall Brook Reservoir . . .	.03	3.06	.0024	.0072	.0023	.19	0.5
Lincoln . . .	Sandy Pond . . .	.02	3.85	.0022	.0076	.0014	.30	0.8
LYNN . . .	Birch Reservoir . . .	.18	6.04	.0070	.0137	.0027	.79	2.2
	Breed's Reservoir . . .	.29	6.95	.0055	.0141	.0031	.78	2.3
	Walden Reservoir . . .	.52	7.58	.0049	.0169	.0036	.79	2.6
	Hawkes Reservoir . . .	.74	9.10	.0058	.0232	.0037	.89	3.8
Manchester . . .	Gravel Pond . . .	.05	4.53	.0011	.0090	.0015	.78	1.5
MARLBOROUGH . . .	Lake Williams . . .	.05	5.61	.0031	.0136	.0035	.64	2.1
	Millham Brook Reservoir . . .	.22	5.51	.0043	.0134	.0034	.46	2.3
Maynard . . .	White Pond . . .	.03	3.02	.0021	.0066	.0014	.27	0.7
Millford . . .	Charles River, filtered . . .	.17	4.47	.0007	.0033	-	.31	1.6
Montague . . .	Lake Pleasant . . .	.04	3.36	.0020	.0056	.0016	.18	1.0
Nantucket . . .	Wannacomet Pond . . .	.04	8.07	.0071	.0134	.0032	2.46	1.5
NEW BEDFORD . . .	Little Quittacas Pond . . .	.16	3.89	.0017	.0113	.0026	.52	0.7
	Great Quittacas Pond . . .	.26	3.99	.0013	.0108	.0020	.51	0.7
NEWBURYPORT . . .	Artichoke River . . .	.37	8.08	.0314	.0309	.0112	.79	3.0
NORTH ADAMS . . .	Notch Brook Reservoir . . .	.03	7.64	.0020	.0034	.0009	.12	6.2
	Broad Brook . . .	.05	4.55	.0025	.0036	.0009	.12	2.4
	Mount Williams Reservoir . . .	.02	7.29	.0016	.0064	.0023	.11	5.3
NORTHAMPTON . . .	Middle Reservoir . . .	.20	5.32	.0020	.0088	.0024	.18	1.9
	Mountain Street Reservoir . . .	.05	4.09	.0008	.0055	.0016	.15	1.9
North Andover . . .	Great Pond . . .	.11	5.05	.0036	.0119	.0027	.46	1.9
Northborough . . .	Lower Reservoir . . .	.45	5.48	.0043	.0158	.0043	.32	1.5
	Upper Reservoir . . .	.62	5.14	.0036	.0168	.0039	.33	1.2
North Brookfield . . .	Doane Pond . . .	.24	4.06	.0073	.0196	.0055	.26	0.8
	North Pond . . .	.24	4.02	.0093	.0231	.0053	.26	0.7
Northfield . . .	Reservoir . . .	.11	3.85	.0006	.0025	.0007	.16	1.5
Norwood . . .	Buckmaster Pond . . .	.13	5.27	.0078	.0171	.0074	.58	1.8
Orange . . .	Reservoir . . .	.20	4.32	.0022	.0054	.0017	.22	0.7
Palmer (Fire District No. 1) . . .	Lower Reservoir . . .	.10	3.92	.0044	.0094	.0019	.22	1.1
	Upper Reservoir . . .	.09	3.31	.0032	.0118	.0031	.22	0.7
PEABODY . . .	Spring Pond . . .	.07	6.19	.0076	.0115	.0028	.83	2.1
	Suntaug Lake . . .	.25	6.39	.0122	.0146	.0032	.83	2.0

## Averages of Chemical Analyses of Surface-Water Sources, etc. — Concluded

[Parts in 100,000]

CITY OR TOWN	Source	Color	Residue on Evaporation	AMMONIA			Chlorine	Hardness
				Free	ALBUMINOID			
					Total	Sus-pended		
PITTSFIELD	Ashley Lake	.09	4.38	.0056	.0090	.0023	.17	2.3
	Ashley Brook	.08	6.37	.0059	.0074	.0019	.17	4.0
	Hathaway Brook	.09	7.77	.0017	.0056	.0025	.14	6.8
	Mill Brook	.29	5.74	.0040	.0122	.0016	.17	2.0
	Sacket Brook	.09	7.51	.0006	.0035	.0008	.16	5.8
Plymouth	Farnham Reservoir	.37	5.94	.0051	.0148	.0025	.16	1.9
	Little South Pond	.02	2.92	.0019	.0094	.0016	.65	0.5
	Great South Pond	.02	2.79	.0016	.0074	.0017	.63	0.5
Randolph	Great Pond	.21	6.08	.0023	.0131	.0033	.78	1.9
Rockport	Cape Pond	.17	10.34	.0036	.0149	.0051	3.09	1.8
Russell	Black Brook	.01	3.55	.0009	.0054	.0019	.14	1.0
Rutland	Muschopauge Lake	.08	3.54	.0042	.0144	.0034	.32	1.2
SALEM	Wenham Lake	.27	8.20	.0046	.0139	.0031	.91	3.0
	Longham Reservoir	.70	9.59	.0096	.0220	.0055	1.05	3.3
	Ipswich River at pumping station	.58	11.19	.0107	.0146	.0027	.87	4.9
Scituate	Inlet of filter	1.01	8.22	.0038	.0278	.0088	1.29	1.8
	Outlet of filter	.01	12.40	.0010	.0054	-	1.32	2.3
Shelburne (Shelburne Falls Fire District)	Fox Brook	.03	6.72	.0005	.0024	.0008	.14	3.6
	Hatchet Brook Reservoir No. 3	.11	3.25	.0035	.0079	.0021	.22	0.9
Southbridge	Hatchet Brook Reservoir No. 4	.19	3.78	.0058	.0098	.0025	.23	1.0
South Hadley (Fire District No. 1)	Leaping Well Reservoir	.03	3.36	.0022	.0105	.0034	.22	0.6
	Buttery Brook Reservoir	.11	5.38	.0053	.0070	.0020	.43	1.7
Spencer	Shaw Pond	.03	2.67	.0007	.0090	.0017	.21	0.7
SPRINGFIELD	Westfield Little River, filtered	.08	4.31	.0006	.0032	-	.18	1.5
Stockbridge	Lake Averic	.11	6.81	.0009	.0098	.0021	.13	4.6
Stoughton	Muddy Pond Brook	.13	4.53	.0019	.0067	.0021	.35	0.7
TAUNTON	Assawampsett Pond	.13	3.79	.0020	.0109	.0021	.50	0.5
	Elder's Pond	.06	3.51	.0016	.0112	.0026	.48	0.5
Wakefield	Crystal Lake	.14	7.55	.0040	.0164	.0047	.92	2.8
Wareham (Onset)	Jonathan Pond	.02	2.91	.0014	.0088	.0026	.62	0.5
WESTFIELD	Montgomery Reservoir	.36	3.54	.0034	.0096	.0026	.17	0.5
	Tillotson Brook Reservoir	.12	3.78	.0045	.0053	.0013	.21	0.9
	Granville Reservoir	.21	3.48	.0058	.0072	.0018	.17	0.7
West Springfield	Bear Hole Brook	.04	8.02	.0032	.0053	.0012	.22	4.4
	Bear Hole Brook, filtered	.01	6.87	.0007	.0020	-	.21	4.3
West Stockbridge	East Mountain Reservoir	.00	6.50	.0004	.0008	.0004	.14	3.3
Weymouth	Great Pond	.16	3.75	.0008	.0075	.0018	.50	0.7
Williamsburg	Reservoir	.07	4.73	.0005	.0048	.0017	.17	1.8
Williamstown	Rattlesnake Brook	.04	7.28	.0006	.0024	.0010	.10	9.0
	Paul Brook	.03	5.02	.0007	.0015	.0005	.12	3.4
Winchester	North Reservoir	.03	4.30	.0017	.0103	.0021	.43	1.8
	South Reservoir	.06	3.75	.0039	.0072	.0013	.41	1.7
WORCESTER	Middle Reservoir	.07	3.71	.0065	.0134	.0025	.37	1.7
	Bottomly Reservoir	.24	5.62	.0045	.0125	.0022	.29	2.1
	Kent Reservoir	.04	4.04	.0032	.0100	.0022	.36	1.5
	Leicester Reservoir	.09	4.77	.0036	.0108	.0025	.29	1.5
	Mann Reservoir	.04	4.05	.0029	.0098	.0022	.23	1.6
	Upper Holden Reservoir	.12	4.12	.0035	.0121	.0031	.26	1.0
	Lower Holden Reservoir	.10	4.19	.0050	.0125	.0028	.26	1.0
	Kendall Reservoir	.13	3.50	.0085	.0127	.0029	.24	0.9
	Pine Hill Reservoir	.20	4.64	.0221	.0211	.0074	.28	1.3

## Averages of Chemical Analyses of Ground-Water Sources for the Year 1930

[Parts in 100,000]

CITY OR TOWN	SOURCE	Color	Residue on Evaporation	AMMONIA		Chlorine	NITROGEN AS —		Hardness	Iron
				Free	Albuminoid		Nitrates	Nitrites		
Acton (West and South Water Supply District)	Tubular wells	.01	9.06	.0003	.0007	.71	.1700	.0000	3.8	.006
Adams (Fire District)	Tubular wells	.00	12.65	.0003	.0004	.16	.0300	.0000	12.4	.006
Amesbury	Tubular wells	.14	15.72	.0074	.0020	.51	.0020	.0001	6.9	.405
	Tubular wells, filtered	.02	14.07	.0006	.0013	.50	.0020	.0000	6.6	.008
Ashland	Tubular wells, new supply	.03	6.76	.0008	.0012	.63	.0062	.0000	2.5	.013
ATTLEBORO	Wells	.05	5.20	.0005	.0013	.44	.0084	.0000	2.2	.030
Auburn	Tubular wells	.00	9.47	.0003	.0004	.65	.1800	.0000	3.9	.006
Avon	Wells	.01	6.57	.0004	.0015	.57	.1333	.0000	2.4	.007
Ayer	Large well	.02	8.36	.0007	.0011	.92	.0477	.0000	3.5	.020
	Tubular wells	.03	7.93	.0007	.0008	.47	.0052	.0000	3.8	.035
Barnstable	Tubular wells	.00	3.55	.0013	.0021	1.25	.0020	.0000	0.7	.013
Bedford	Large well	.06	4.17	.0009	.0019	.40	.0047	.0000	1.2	.013
Belchertown	Tubular wells	.01	7.45	.0010	.0015	.36	.0020	.0002	3.1	.024
Billerica	Wells	.24	9.28	.0043	.0033	.53	.0051	.0003	3.3	.063
Bourne (Monument Beach)	Wells	.01	4.57	.0011	.0015	.98	.0333	.0000	1.4	.007
Bridgewater	Wells	.00	5.42	.0006	.0006	.68	.1100	.0000	1.7	.007
Brookline	Tubular wells and filter-gallery, filtered	.07	10.34	.0015	.0033	.86	.0268	.0000	4.6	.008
Canton	Springdale well	.07	6.20	.0004	.0010	.63	.0300	.0000	2.6	.009
	Well near Henry's Spring	.05	5.63	.0010	.0017	.59	.0567	.0000	1.9	.010
	Ward well	.03	6.60	.0003	.0011	.63	.0250	.0000	2.6	.006
Chatham	Filter gallery	.00	5.23	.0029	.0043	1.91	.0023	.0000	0.8	.012
Chelmsford (North Chelmsford Fire District)	Tubular wells	.14	5.44	.0152	.0060	.46	.0070	.0001	2.2	.024
Chelmsford (Water District)	Tubular wells	.02	9.30	.0002	.0005	.69	.1550	.0012	3.5	.015
Cohasset	Tubular wells	.01	13.80	.0003	.0010	1.83	.2125	.0000	4.5	.009
	Dug well, filtered	.03	6.40	.0028	.0028	1.08	.0020	.0000	2.2	.008
Cummington	Tubular wells	.05	4.30	.0004	.0008	.19	.0633	.0000	2.4	.010
Dedham	Large well and tubular wells	.02	11.32	.0014	.0022	1.10	.1283	.0001	4.5	.009
Deerfield (Fire District)	Wells	.00	4.52	.0002	.0006	.21	.0072	.0000	1.7	.009
Douglas	Tubular wells	.00	5.15	.0004	.0006	.35	.0425	.0000	1.9	.011
Dracut (Water Supply District)	Tubular wells	.02	14.70	.0007	.0013	.80	.1767	.0001	6.3	.018
Dracut (Collinsville)	Tubular wells	.01	7.07	.0008	.0021	.47	.0330	.0000	2.7	.034
Dudley	Tubular wells	.00	5.47	.0005	.0013	.28	.0047	.0000	1.3	.006
Dunstable	Well	.01	5.70	.0003	.0012	.34	.0110	.0000	2.1	.006
Duxbury (Fire and Water District)	Tubular wells	.00	7.77	.0005	.0007	.84	.0057	.0000	0.5	.005
East Brookfield	Tubular wells	.00	3.27	.0003	.0011	.22	.0020	.0000	0.6	.006
Easthampton	Tubular wells	.00	7.30	.0003	.0007	.19	.0167	.0000	3.7	.007
Easton (North Easton Village District)	Well	.01	5.92	.0008	.0020	.51	.0800	.0000	2.2	.008
Edgartown	Large well	.04	3.93	.0006	.0009	.97	.0020	.0000	0.5	.015
Fairhaven	Old wells	.23	8.95	.0009	.0044	1.13	.0667	.0001	3.1	.014
	New wells	.00	7.45	.0003	.0012	.95	.1125	.0000	2.0	.005
Foxborough (Water Supply District)	Tubular wells	.00	5.67	.0003	.0007	.45	.0633	.0000	2.0	.009
Framingham	Filter-gallery	.01	16.99	.0029	.0027	2.13	.0447	.0007	6.5	.011
Franklin	Tubular wells	.01	5.90	.0003	.0011	.58	.0073	.0000	2.2	.008
Gill	Spring	.01	8.15	.0006	.0012	.24	.0850	.0000	3.4	.010
Grafton	Filter-gallery	.00	10.61	.0002	.0009	1.14	.1575	.0000	3.6	.008
Granville	Well	.00	3.73	.0005	.0007	.15	.0030	.0000	0.9	.009
Great Barrington (Fire District)	Well near Green River	.02	10.30	.0005	.0008	.13	.0137	.0000	6.5	.022
	Filter-gallery near Green River	.00	10.25	.0003	.0011	.14	.0137	.0000	6.8	.007
Greenfield	Well near Green River	.02	7.43	.0005	.0021	.19	.0020	.0000	4.5	.008
Groton	Large well	.00	8.20	.0025	.0017	.24	.0020	.0000	4.2	.006
Groton (West Groton Water Supply District)	Tubular wells	.00	5.47	.0009	.0009	.23	.0082	.0000	3.0	.040
Hardwick (Gilbertville)	Wells	.01	8.23	.0003	.0006	.17	.0020	.0000	4.0	.008
Hardwick (Wheelwright)	Wells	.01	4.80	.0003	.0005	.22	.0057	.0000	0.6	.004
Hingham	Wells	.08	5.86	.0025	.0033	.72	.0111	.0001	1.9	.007
Holliston	Large wells	.26	6.07	.0036	.0064	.41	.0220	.0000	2.4	.047
Hopkinton	New tubular wells	.01	6.27	.0025	.0009	.41	.1550	.0004	2.5	.016
Kingston	Tubular wells	.00	4.92	.0001	.0005	.66	.0065	.0000	0.9	.008



*Averages of Chemical Analyses of Ground-Water Sources, etc. — Continued*  
[Parts in 100,000]

CITY OR TOWN	SOURCE	Color	Residue on Evaporation	AMMONIA		Chlorine	NITROGEN AS —		Hardness	Iron
				Free	Albuminoid		Nitrates	Nitrites		
Leicester (Water Supply District)	Wells	.19	7.13	.0010	.0036	.29	.0400	.0000	2.4	.026
Leicester (Cherry Valley and Rochdale Water District)	Wells	.14	6.17	.0017	.0089	.39	.0020	.0000	2.0	.013
Littleton	Tubular wells	.01	4.77	.0007	.0008	.23	.0167	.0000	1.8	.011
LOWELL	Boulevard wells (tubular)	.71	8.08	.0434	.0044	.57	.0187	.0001	2.8	.342
	Boulevard wells, filtered	.09	6.71	.0005	.0021	.55	.0300	.0000	2.7	.018
Manchester	Wells	.00	11.62	.0015	.0013	1.68	.1020	.0001	3.4	.021
Mansfield (Water Supply District)	Large well	.00	4.58	.0002	.0007	.33	.0092	.0000	1.2	.006
Marblehead	Inlet of filter	.03	18.68	.0063	.0020	2.11	.0030	.0001	7.9	.102
	Outlet of filter	.07	19.93	.0003	.0030	1.84	.0025	.0000	8.8	.022
	Well	.11	20.55	.0006	.0023	2.55	.0050	.0000	8.9	.022
Marion	Old wells	.00	4.70	.0004	.0008	.70	.0187	.0000	1.5	.006
	New wells	.01	10.05	.0002	.0005	1.83	.0180	.0004	3.4	.018
Marshfield	Tubular wells	.01	5.66	.0003	.0007	.74	.0020	.0000	0.7	.017
	Tubular wells at Humarock Beach	.00	8.10	.0003	.0007	1.92	.0400	.0000	1.6	.008
Mattapoisett	New wells	.00	7.13	.0002	.0005	.98	.0020	.0002	2.3	.006
Medfield	Spring	.00	4.13	.0029	.0011	.32	.0057	.0000	1.2	.007
Medway	Wells	.02	9.24	.0072	.0019	1.06	.0404	.0000	3.2	.011
Merrimac	Tubular wells	.01	8.70	.0008	.0007	.58	.0325	.0000	3.4	.013
Methuen	Tubular wells at Harris Brook	.39	7.37	.0046	.0092	.48	.0150	.0001	2.8	.047
	Tubular wells at Pine Island	.00	11.27	.0004	.0009	.81	.1194	.0000	5.7	.008
Middleborough (Fire District)	Well	.15	6.80	.0066	.0052	.62	.0190	.0001	2.5	.284
	Filtered water	.28	6.56	.0075	.0030	.62	.0260	.0002	2.4	.138
Millbury	Well	.00	4.93	.0001	.0009	.37	.0307	.0000	2.1	.011
Millis	Spring	.00	13.74	.0009	.0011	1.02	.2333	.0001	5.7	.012
Monson	Old well	.09	4.32	.0003	.0022	.21	.0020	.0000	1.0	.015
	New well	.00	3.50	.0012	.0013	.19	.0020	.0000	0.7	.006
Monterey	Springs	.01	9.60	.0007	.0023	.14	—	—	7.9	.007
Nantucket	Wells at Wyers Valley	.00	5.86	.0006	.0008	1.82	.0020	.0000	1.3	.006
Natick	Large well	.01	11.48	.0003	.0008	1.14	.0467	.0000	5.2	.005
Needham	Old wells and Hicks Spring	.00	10.10	.0004	.0009	.86	.2387	.0000	3.5	.010
	New wells	.01	8.88	.0006	.0018	.85	.1067	.0000	3.3	.012
NEWBURYPORT	Wells and Artichoke River, filtered	.11	11.76	.0010	.0068	.75	.0174	.0001	3.3	.016
NEWTON	Tubular wells and filter-gallery	.03	8.49	.0009	.0018	.79	.0104	.0000	3.7	.019
North Attleborough	Wells	.03	6.63	.0007	.0013	.62	.0400	.0000	2.8	.015
Northbridge	Tubular wells	.01	4.08	.0003	.0008	.36	.0030	.0000	1.3	.011
Norton	Tubular wells	.00	4.83	.0003	.0009	.32	.0020	.0000	1.5	.007
Norwood	Tubular wells	.05	9.47	.0015	.0024	.69	.0683	.0000	3.8	.040
Oak Bluffs	Springs	.00	4.03	.0005	.0006	.92	.0290	.0000	0.5	.008
Orange	Crystal Spring	.09	3.88	.0003	.0019	.15	—	—	0.6	.008
Oxford	Tubular wells	.00	5.43	.0001	.0005	.31	.0300	.0000	2.0	.006
Palmer (Bondsville)	Tubular wells	.00	7.10	.0002	.0015	.28	.0233	.0000	2.3	.007
Pepperell	Tubular wells	.00	3.90	.0001	.0007	.21	.0030	.0000	1.3	.006
Provincetown	Tubular wells	.00	8.92	.0003	.0007	3.07	.0033	.0000	1.6	.011
Reading	Filter-gallery	.77	9.45	.0155	.0117	1.12	.0033	.0000	2.6	.277
	Tap in pumping station	.04	16.05	.0096	.0036	1.07	.0020	.0001	6.6	.021
Salisbury	Old well	.12	7.34	.0008	.0028	.56	.0020	.0000	3.1	.013
	New well	.10	10.14	.0005	.0012	.59	.0020	.0000	5.0	.054
Scituate	Webster Meadow wells	.01	9.46	.0004	.0012	1.41	.0575	.0000	3.6	.005
Sharon	Well	.00	23.17	.0006	.0007	4.18	.4250	.0000	8.6	.006
	Tubular wells	.00	6.40	.0003	.0012	.63	.0450	.0000	2.0	.008
Sheffield	Smith Spring	.01	4.12	.0003	.0009	.15	.0020	.0000	1.8	.005
	Clark's Spring	.04	6.32	.0003	.0022	.16	.0020	.0000	3.2	.008
Shirley (Shirley Village Water District)	Well	.00	4.95	.0004	.0005	.49	.1675	.0000	1.7	.005
Shrewsbury	Tubular wells	.01	6.15	.0005	.0015	.46	.0377	.0000	2.6	.020
Somerset	Tubular wells	.00	7.48	.0006	.0010	.57	.0032	.0000	2.7	.009
South Hadley (Fire District No. 2)	Large well	.00	4.80	.0004	.0011	.19	.0020	.0000	3.0	.007
Sunderland	Springs	.02	7.07	.0007	.0011	.17	.0020	.0000	4.0	.008
Tisbury	Well	.06	2.60	.0000	.0008	.92	.0020	.0000	0.5	.005
Uxbridge	Tubular wells	.00	6.87	.0005	.0009	.54	.1300	.0000	2.1	.017
Walpole	Tubular wells	.01	5.03	.0005	.0011	.45	.0500	.0000	2.1	.007

## Averages of Chemical Analyses of Ground-Water Sources, etc. — Concluded

[Parts in 100,000]

CITY OR TOWN	SOURCE	Color	Residue on Evaporation	AMMONIA		Chlorine	NITROGEN AS —		Hardness	Iron
				Free	Albuminoid		Nitrates	Nitrites		
WALTHAM . . .	Old well . . .	.12	11.91	.0071	.0027	.89	.0107	.0000	4.5	.369
	New well . . .	.00	8.57	.0007	.0016	.67	.0151	.0000	4.2	.005
Ware . . . . .	Wells . . . . .	.01	8.23	.0003	.0006	.58	.1444	.0001	3.3	.011
	Large well . . .	.00	7.26	.0004	.0008	.46	.1233	.0000	2.8	.009
Wareham (Fire District)	Tubular wells . .	.01	4.03	.0004	.0007	.58	.0020	.0000	0.5	.008
Warren . . . . .	Tubular wells . .	.00	4.20	.0008	.0007	.26	.0133	.0000	0.8	.005
Wayland . . . . .	Wells . . . . .	.00	8.10	.0007	.0008	.55	.0567	.0000	3.6	.008
Webster . . . . .	Wells . . . . .	.03	4.90	.0013	.0005	.32	.0073	.0000	1.8	.013
Wellesley . . . . .	Tubular wells . .	.01	11.78	.0004	.0010	1.06	.1000	.0000	4.4	.015
	Well at Williams Spring . . .	.01	10.00	.0003	.0032	1.33	.0360	.0000	4.2	.006
	Filter-gallery . .	.00	12.03	.0004	.0011	1.12	.1517	.0000	4.7	.008
Westborough . . .	Filter basin . . .	.02	3.46	.0019	.0105	.29	—	—	0.9	.009
West Brookfield .	Tubular wells . .	.00	4.90	.0004	.0007	.23	.0020	.0000	1.0	.005
Westford . . . . .	Tubular wells . .	.00	5.97	.0006	.0007	.22	.0035	.0001	2.3	.009
Weston . . . . .	Well at Warren Ave. Tubular wells at Kendal Green . .	.03	8.07	.0006	.0033	.62	.0425	.0000	3.8	.009
	Johnson's Spring . .	.01	9.17	.0001	.0010	.78	.0600	.0000	3.4	.013
West Stockbridge .	Cold Spring . . .	.07	5.50	.0004	.0018	.15	.0050	.0000	3.0	.004
Williamstown . . .	Sherman Spring . .	.03	11.56	.0007	.0014	.10	.0233	.0000	10.8	.006
	Tubular wells . . .	.01	7.97	.0005	.0007	.09	.0050	.0000	6.6	.006
Wilmington . . . .	Old wells . . . .	.01	7.80	.0004	.0007	.97	.1145	.0000	2.9	.006
Winchendon . . . .	New wells . . . .	.22	3.50	.0013	.0014	.16	.0020	.0000	1.0	.089
	Filter-gallery . . .	.14	3.50	.0007	.0029	.16	.0020	.0000	0.6	.008
WOBURN . . . . .	Layne well . . . .	.02	11.17	.0029	.0048	1.22	.0122	.0002	4.6	.007
	Springs . . . . .	.01	13.42	.0063	.0026	1.43	.0108	.0001	5.7	.008
Worthington (Fire District) . . . . .	Tubular wells . . .	.03	3.33	.0004	.0021	.13	.0020	.0000	1.4	.107
Wrentham . . . . .	Wells . . . . .	.00	4.47	.0003	.0007	.33	.0550	.0000	1.7	.008

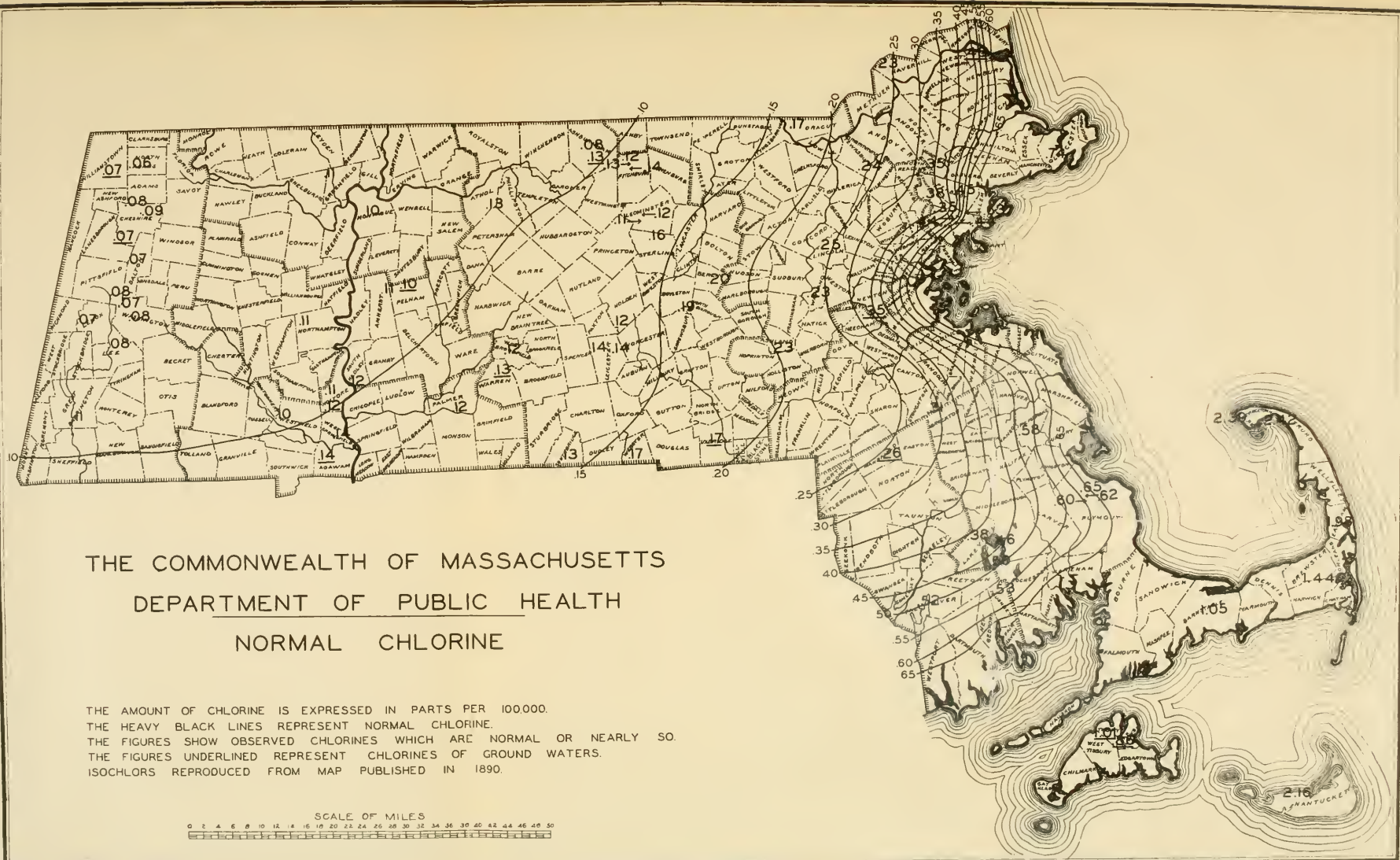
## COMPARISONS OF WATER SUPPLIES

The Department from time to time receives requests for comparisons of chemical analyses of the water of the various public water supplies in this State, and the following tables have been arranged with a view of showing such comparisons. In these the various ground-water sources are arranged in order of their chlorine content, hardness and iron; and the surface-water supplies are arranged in order of their nitrogen content as represented by albuminoid ammonia. There are also tables of the surface-water supplies arranged according to color and hardness. In the table showing the chlorine content of the water there is a column indicating the excess chlorine over the normal for the region in which the source is located, this normal being that referred to in the annual report of the Department for 1890 and shown on a map appended hereto which is a reproduction of that published in the 1890 report. The isochlors shown on this map probably represent the normal chlorine content of the waters of the State at the present time. In using the tables of comparison of analyses it should be realized that a high chlorine content, hardness of the water and high iron may be normal for some ground water supplies; and in the case of some of the surface supplies the water may normally have a high nitrogen content and be considerably colored due to the natural condition of the watershed.

## Chlorine in Ground Waters

[Parts in 100,000]

	Chlorine	Excess Chlorine
Williamstown, Sherman Spring . . . . .	.09	.02
Williamstown, Cold Spring . . . . .	.10	.03
Great Barrington (Fire District), Well near Green River . . . . .	.13	.02
Worthington (Fire District), Springs . . . . .	.13	.04
Great Barrington (Fire District), Filter-gallery near Green River . . . . .	.14	.03
Monterey, Springs . . . . .	.14	.05
Granville, Well . . . . .	.15	.05
Orange, Crystal Spring . . . . .	.15	.05
Sheffield, Smith Spring . . . . .	.15	.05
West Stockbridge, Johnson's Spring . . . . .	.15	—
Adams (Fire District), Tubular wells . . . . .	.16	.08
Sheffield, Clark's Spring . . . . .	.16	.06
Winchendon, Old wells . . . . .	.16	.06
Winchendon, New wells . . . . .	.16	.06







*Chlorine in Ground Waters — Continued*

[Parts in 100,000]

	Chlorine	Excess Chlorine
Hardwick (Gilbertville) Wells . . . . .	.17	.06
Sunderland, Springs . . . . .	.17	.07
Cummington, Tubular wells . . . . .	.19	.11
Easthampton, Tubular wells . . . . .	.19	.08
Greenfield, Well near Green River . . . . .	.19	.08
Monson, New well . . . . .	.19	.06
South Hadley (Fire District No. 2), Large well . . . . .	.19	.08
Deerfield (Fire District), Wells . . . . .	.21	.11
Monson, Old well . . . . .	.21	.08
Pepperell, Tubular wells . . . . .	.21	.08
East Brookfield, Tubular wells . . . . .	.22	.09
Hardwick (Wheelwright), Wells . . . . .	.22	.11
Westford, Tubular wells . . . . .	.22	.05
Groton (West Groton Water Supply District), Tubular wells . . . . .	.23	.08
Littleton, Tubular wells . . . . .	.23	.06
West Brookfield, Tubular wells . . . . .	.23	.11
Gill, Spring . . . . .	.24	.14
Groton, Large well . . . . .	.24	.09
Warren, Tubular wells . . . . .	.26	.13
Dudley, Tubular wells . . . . .	.28	.12
Palmer (Bondsville), Tubular wells . . . . .	.28	.16
Leicester (Water Supply District), Wells . . . . .	.29	.15
Westborough, Filter basin . . . . .	.29	.11
Oxford, Tubular wells . . . . .	.31	.16
Medfield, Spring . . . . .	.32	.09
Norton, Tubular wells . . . . .	.32	.02
Webster, Wells . . . . .	.32	.16
Mansfield (Water Supply District), Large well . . . . .	.33	.07
Wrentham, Tubular wells . . . . .	.33	.10
Dunstable, Well . . . . .	.34	.19
Douglas, Tubular wells . . . . .	.35	.18
Belchertown, Tubular wells . . . . .	.36	.26
Northbridge, Tubular wells . . . . .	.36	.13
Millbury, Well . . . . .	.37	.22
Leicester (Cherry Valley and Rochdale Water District), Wells . . . . .	.39	.25
Bedford, Large well . . . . .	.40	.15
Holliston, Large well . . . . .	.41	.21
Hopkinton, New tubular wells . . . . .	.41	.22
Attleboro, Wells . . . . .	.44	.16
Foxborough (Water Supply District), Tubular wells . . . . .	.45	.21
Walpole, Tubular wells . . . . .	.45	.22
Chelmsford (North Chelmsford Fire District), Tubular wells . . . . .	.46	.29
Shrewsbury, Tubular wells . . . . .	.46	.30
Ware, Large well . . . . .	.46	.35
Ayer, Tubular wells . . . . .	.47	.32
Dracut (Collinsville), Tubular wells . . . . .	.47	.29
Methuen, Tubular wells at Harris Brook . . . . .	.48	.26
Shirley (Shirley Village Water District), Well . . . . .	.49	.35
Amesbury, Tubular wells, filtered . . . . .	.50	.10
Amesbury, Tubular wells . . . . .	.51	.11
Easton (North Easton Village District), Well . . . . .	.51	.23
Billerica, Wells . . . . .	.53	.29
Uxbridge, Tubular wells . . . . .	.54	.36
Lowell, Boulevard wells, filtered . . . . .	.55	.35
Wayland, Wells . . . . .	.55	.30
Salisbury, Old well . . . . .	.56	.06
Avon, Wells . . . . .	.57	.27
Lowell, Boulevard wells (Tubular) . . . . .	.57	.37
Somerset, Tubular wells . . . . .	.57	.12
Franklin, Tubular wells . . . . .	.58	.36
Merrimac, Tubular wells . . . . .	.58	.23
Ware, Wells . . . . .	.58	.47
Wareham (Fire District), Tubular wells . . . . .	.58	-
Canton, Well near Henry's Spring . . . . .	.59	.31
Salisbury, New well . . . . .	.59	.09
Middleborough (Fire District), Well . . . . .	.62	.18
Middleborough (Fire District), Filtered water . . . . .	.62	.18
North Attleborough, Wells . . . . .	.62	.37
Weston, Well at Warren Avenue . . . . .	.62	.34
Ashland, Tubular wells, new supply . . . . .	.63	.43
Canton, Springdale well . . . . .	.63	.36
Canton, Ward well . . . . .	.63	-
Sharon, Tubular wells . . . . .	.63	.38
Auburn, Tubular wells . . . . .	.65	.51
Kingston, Tubular wells . . . . .	.66	.06
Waltham, New well . . . . .	.67	.37
Bridgewater, Wells . . . . .	.68	.33
Chelmsford (Water District), Tubular wells . . . . .	.69	.49
Norwood, Tubular wells . . . . .	.69	.44
Marion, Old wells . . . . .	.70	.09
Acton (West and South Water Supply District), Tubular wells . . . . .	.71	.51
Hingham, Wells . . . . .	.72	.12
Marshfield, Tubular wells . . . . .	.74	-
Newburyport, Wells and Artichoke River, filtered . . . . .	.75	.30
Weston, Tubular wells at Kendal Green . . . . .	.78	.50
Newton, Tubular wells and filter-gallery . . . . .	.79	.44

*Chlorine in Ground Waters—Concluded*

[Parts in 100,000]

	Chlorine	Excess Chlorine
Dracut (Water Supply District), Tubular wells	.80	.60
Methuen, Tubular wells at Pine Island	.81	.59
Duxbury (Fire and Water District), Tubular wells	.84	.19
Needham, New wells	.85	.55
Brookline, Tubular wells and filter-gallery, filtered	.86	.56
Needham, Old wells and Hicks Spring	.86	.51
Waltham, Old well	.89	.59
Ayer, Large well	.92	.77
Oak Bluffs, Springs	.92	.06
Tisbury, Well	.92	—
Fairhaven, New wells	.95	.30
Edgartown, Large well	.97	.11
Wilmington, Tubular wells	.97	.70
Bourne (Monument Beach), Wells	.98	—
Mattapoisett, New wells	.98	.33
Millis, Spring	1.02	.80
Medway, Wells	1.06	.85
Wellesley, Tubular wells	1.06	.76
Reading, Tap in pumping station	1.07	.72
Cohasset, Dug well, filtered	1.08	—
Dedham, Large well and tubular wells	1.10	.80
Reading, Filter-gallery	1.12	.77
Wellesley, Filter-gallery	1.12	.82
Fairhaven, Old wells	1.13	.48
Grafton, Filter-gallery	1.14	.97
Natick, Large well	1.14	.90
Woburn, Filter-gallery	1.22	.91
Barnstable, Tubular wells	1.25	.20
Wellesley, Well at Williams Spring	1.33	1.03
Scituate, Webster Meadow wells	1.41	—
Woburn, Layne well	1.43	1.12
Manchester, Wells	1.68	.94
Nantucket, Wells at Wyers Valley	1.82	—
Cohasset, Tubular wells	1.83	—
Marion, New wells	1.83	1.22
Marblehead, Outlet of filter	1.84	—
Chatham, Filter-gallery	1.91	.47
Marshfield, Tubular wells at Humarock Beach	1.92	—
Marblehead, Inlet of filter	2.11	—
Framingham, Filter-gallery	2.13	1.90
Marblehead, Well	2.55	—
Provincetown, Tubular wells	3.07	.67
Sharon, Well	4.18	3.93

*Hardness of Ground Waters*

[Parts in 100,000]

Duxbury (Fire and Water District), Tubular wells	0.5
Edgartown, Large well	0.5
Oak Bluffs, Springs	0.5
Tisbury, Well	0.5
Wareham (Fire District), Tubular wells	0.5
East Brookfield, Tubular wells	0.6
Hardwick (Wheelwright), Wells	0.6
Orange, Crystal Spring	0.6
Winchendon, New wells	0.6
Barnstable, Tubular wells	0.7
Marshfield, Tubular wells	0.7
Monson, New well	0.7
Chatham, Filter-gallery	0.8
Warren, Tubular wells	0.8
Granville, Well	0.9
Kingston, Tubular wells	0.9
Westborough, Filter basin	0.9
Monson, Old well	1.0
West Brookfield, Tubular wells	1.0
Winchendon, Old wells	1.0
Bedford, Large well	1.2
Mansfield (Water Supply District), Large well	1.2
Medfield, Spring	1.2
Dudley, Tubular wells	1.3
Nantucket, Wells at Wyers Valley	1.3
Northbridge, Tubular wells	1.3
Pepperell, Tubular wells	1.3
Bourne (Monument Beach), Wells	1.4
Worthington (Fire District), Springs	1.4
Marion, Old wells	1.5
Norton, Tubular wells	1.5
Marshfield, Tubular wells at Humarock Beach	1.6
Provincetown, Tubular wells	1.6
Bridgewater, Wells	1.7
Deerfield (Fire District), Wells	1.7
Shirley (Shirley Village Water District), Well	1.7
Wrentham, Tubular wells	1.7
Littleton, Tubular wells	1.8



*Hardness of Ground Waters — Continued*

[Parts in 100,000]

Sheffield, Smith Spring	1.8
Webster, Wells	1.8
Canton, Well near Henry's Spring	1.9
Douglas, Tubular wells	1.9
Hingham, Wells	1.9
Fairhaven, New wells	2.0
Foxborough (Water Supply District), Tubular wells	2.0
Leicester (Cherry Valley and Rochdale Water District), Wells	2.0
Oxford, Tubular wells	2.0
Sharon, Tubular wells	2.0
Dunstable, Well	2.1
Millbury, Well	2.1
Uxbridge, Tubular wells	2.1
Walpole, Tubular wells	2.1
Attleboro, Wells	2.2
Chelmsford (North Chelmsford Fire District), Tubular wells	2.2
Cohasset, Dug well, filtered	2.2
Easton (North Easton Village District), Well	2.2
Franklin, Tubular wells	2.2
Mattapoisett, New wells	2.3
Palmer (Bondsville), Tubular wells	2.3
Westford, Tubular wells	2.3
Avon, Wells	2.4
Cummington, Tubular wells	2.4
Holliston, Large well	2.4
Leicester (Water Supply District), Wells	2.4
Middleborough (Fire District), Filtered water	2.4
Ashland, Tubular wells, new supply	2.5
Hopkinton, New tubular wells	2.5
Middleborough (Fire District), Well	2.5
Canton, Springdale well	2.6
Canton, Ward well	2.6
Reading, Filter-gallery	2.6
Shrewsbury, Tubular wells	2.6
Dracut (Collinsville), Tubular wells	2.7
Lowell, Boulevard wells, filtered	2.7
Somerset, Tubular wells	2.7
Lowell, Boulevard wells (tubular)	2.8
Methuen, Tubular wells at Harris Brook	2.8
North Attleborough, Wells	2.8
Ware, Large well	2.8
Wilmington, Tubular wells	2.9
Groton (West Groton Water Supply District), Tubular wells	3.0
South Hadley (Fire District No. 2), Large well	3.0
West Stockbridge, Johnson's Spring	3.0
Belchertown, Tubular wells	3.1
Fairhaven, Old wells	3.1
Salisbury, Old wells	3.1
Medway, Wells	3.2
Sheffield, Clark's Spring	3.2
Billerica, Wells	3.3
Needham, New wells	3.3
Newburyport, Wells and Artichoke River, filtered	3.3
Ware, Wells	3.3
Gill, Spring	3.4
Manchester, Wells	3.4
Marion, New wells	3.4
Merrimac, Tubular wells	3.4
Weston, Tubular wells at Kendal Green	3.4
Ayer, Large well	3.5
Chelmsford (Water District), Tubular wells	3.5
Needham, Old wells and Hicks Spring	3.5
Grafton, Filter-gallery	3.6
Scituate, Webster Meadow wells	3.6
Wayland, Wells	3.6
Easthampton, Tubular wells	3.7
Newton, Tubular wells and filter-gallery	3.7
Acton (West and South Water Supply District), Tubular wells	3.8
Ayer, Tubular wells	3.8
Norwood, Tubular wells	3.8
Weston, Well at Warren Avenue	3.8
Auburn, Tubular wells	3.9
Hardwick (Gilbertville), Wells	4.0
Sunderland, Springs	4.0
Groton, Large well	4.2
Waltham, New well	4.2
Wellesley, Well at Williams Spring	4.2
Wellesley, Tubular wells	4.4
Cohasset, Tubular wells	4.5
Dedham, Large well and tubular wells	4.5
Greenfield, Well near Green River	4.5
Waltham, Old well	4.5
Brookline, Tubular wells and filter-gallery, filtered	4.6
Woburn, Filter-gallery	4.6
Wellesley, Filter-gallery	4.7
Salisbury, New well	5.0
Natick, Large well	5.2
Millis, Spring	5.7

*Hardness of Ground Waters — Concluded*

[Parts in 100,000]

Methuen, Tubular wells at Pine Island	5.7
Woburn, Layne well	5.7
Dracut (Water Supply District), Tubular wells	6.3
Framingham, Filter-gallery	6.5
Great Barrington (Fire District), Well near Green River	6.5
Amesbury, Tubular wells, filtered	6.6
Reading, Tap in Pumping Station	6.6
Williamstown, Sherman Spring	6.6
Great Barrington (Fire District), Filter-gallery near Green River	6.8
Amesbury, Tubular wells	6.9
Marblehead, Inlet of filter	7.9
Monterey, Springs	7.9
Sharon, Well	8.6
Marblehead, Outlet of filter	8.8
Marblehead, Well	8.9
Williamstown, Cold Spring	10.8
Adams (Fire District), Tubular wells	12.4

*Iron in Ground Waters*

[Parts in 100,000]

Hardwick (Wheelwright), Wells	.004
West Stockbridge, Johnson's Spring	.004
Duxbury (Fire and Water District), Tubular wells	.005
Fairhaven, New wells	.005
Natick, Large well	.005
Scituate, Webster Meadow wells	.005
Sheffield, Smith Spring	.005
Shirley (Shirley Village Water District), Well	.005
Tisbury, Well	.005
Waltham, New well	.005
Warren, Tubular wells	.005
West Brookfield, Tubular wells	.005
Acton (West and South Water Supply District), Tubular wells	.006
Adams (Fire District), Tubular wells	.006
Auburn, Tubular wells	.006
Canton, Ward well	.006
Dudley, Tubular wells	.006
Dunstable, Well	.006
East Brookfield, Tubular wells	.006
Groton, Large well	.006
Mansfield (Water Supply District), Large well	.006
Marion, Old wells	.006
Mattapoisett, New wells	.006
Monson, New well	.006
Nantucket, Wells at Wyers Valley	.006
Oxford, Tubular wells	.006
Pepperell, Tubular wells	.006
Sharon, Well	.006
Wellesley, Well at Williams Spring	.006
Williamstown, Cold Spring	.006
Williamstown, Sherman Spring	.006
Wilmington, Tubular wells	.006
Avon, Wells	.007
Bourne (Monument Beach), Wells	.007
Bridgewater, Wells	.007
Easthampton, Tubular wells	.007
Great Barrington (Fire District), Filter-gallery near Green River	.007
Hingham, Wells	.007
Medfield, Spring	.007
Monterey, Springs	.007
Norton, Tubular wells	.007
Palmer (Bondsville), Tubular wells	.007
South Hadley (Fire District No. 2), Large well	.007
Walpole, Tubular wells	.007
Woburn, Filter-gallery	.007
Amesbury, Tubular wells, filtered	.008
Brookline, Tubular wells and filter-gallery, filtered	.008
Cohasset, Dug well, filtered	.008
Easton (North Easton Village District), Well	.008
Franklin, Tubular wells	.008
Grafton, Filter-gallery	.008
Greenfield, Well near Green River	.008
Kingston (Gilbertville), Wells	.008
Kingston, Tubular wells	.008
Marshfield, Tubular wells at Humarock Beach	.008
Methuen, Tubular wells at Pine Island	.008
Oak Bluffs, Springs	.008
Orange, Crystal Spring	.008
Sharon, Tubular wells	.008
Sheffield, Clark's Spring	.008
Sunderland, Springs	.008
Wareham (Fire District), Tubular wells	.008
Wayland, Wells	.008
Wellesley, Filter-gallery	.008
Winchendon, New wells	.008
Woburn, Layne well	.008
Wrentham, Tubular wells	.008

*Iron in Ground Waters — Concluded*

[Parts in 100,000]

Canton, Springdale well . . . . .	.009
Cohasset, Tubular wells . . . . .	.009
Dedham, Large well and tubular wells . . . . .	.009
Deerfield (Fire District), Wells . . . . .	.009
Foxborough (Water Supply District), Tubular wells . . . . .	.009
Granville, Well . . . . .	.009
Somerset, Tubular wells . . . . .	.009
Ware, Large well . . . . .	.009
Westborough, Filter basin . . . . .	.009
Westford, Tubular wells . . . . .	.009
Weston, Well at Warren Avenue . . . . .	.009
Canton, Well at Henry's Spring . . . . .	.010
Cummington, Tubular wells . . . . .	.010
Gill, Spring . . . . .	.010
Needham, Old wells and Hicks Spring . . . . .	.010
Douglas, Tubular wells . . . . .	.011
Framingham, Filter-gallery . . . . .	.011
Littleton, Tubular wells . . . . .	.011
Medway, Wells . . . . .	.011
Milbury, Well . . . . .	.011
Northbridge, Tubular wells . . . . .	.011
Provincetown, Tubular wells . . . . .	.011
Ware, Wells . . . . .	.011
Chatham, Filter-gallery . . . . .	.012
Millis, Spring . . . . .	.012
Needham, New wells . . . . .	.012
Ashland, Tubular wells, new supply . . . . .	.013
Barnstable, Tubular wells . . . . .	.013
Bedford, Large well . . . . .	.013
Leicester (Cherry Valley and Rochdale Water District), Wells . . . . .	.013
Merrimac, Tubular wells . . . . .	.013
Salisbury, Old well . . . . .	.013
Webster, Wells . . . . .	.013
Weston, Tubular wells at Kendal Green . . . . .	.013
Fairhaven, Old wells . . . . .	.014
Chelmsford (Water District), Tubular wells . . . . .	.015
Edgartown, Large well . . . . .	.015
Monson, Old well . . . . .	.015
North Attleborough, Wells . . . . .	.015
Wellesley, Tubular wells . . . . .	.015
Hopkinton, New tubular wells . . . . .	.016
Newburyport, Wells and Artichoke River, filtered . . . . .	.016
Marshfield, Tubular wells . . . . .	.017
Uxbridge, Tubular wells . . . . .	.017
Dracut (Water Supply District), Tubular wells . . . . .	.018
Lowell, Boulevard wells, filtered . . . . .	.018
Marion, New wells . . . . .	.018
Newton, Tubular wells and filter-gallery . . . . .	.019
Ayer, Large well . . . . .	.020
Shrewsbury, Tubular wells . . . . .	.020
Manchester, Wells . . . . .	.021
Reading, Tap in pumping station . . . . .	.021
Great Barrington (Fire District), Well near Green River . . . . .	.022
Marblehead, Outlet of filter . . . . .	.022
Marblehead, Well . . . . .	.022
Belchertown, Tubular wells . . . . .	.024
Chelmsford (North Chelmsford Fire District), Tubular wells . . . . .	.024
Leicester (Water Supply District), Wells . . . . .	.026
Attleboro, Wells . . . . .	.030
Dracut (Collinsville), Tubular wells . . . . .	.034
Ayer, Tubular wells . . . . .	.035
Groton (West Groton Water Supply District), Tubular wells . . . . .	.040
Norwood, Tubular wells . . . . .	.040
Holliston, Large well . . . . .	.047
Methuen, Tubular wells at Harris Brook . . . . .	.047
Salisbury, New well . . . . .	.054
Billerica, Wells . . . . .	.063
Winchendon, Old wells . . . . .	.089
Marblehead, Inlet of filter . . . . .	.102
Worthington (Fire District), Springs . . . . .	.107
Middleborough (Fire District), Filtered water . . . . .	.138
Reading, Filter-gallery . . . . .	.277
Middleborough (Fire District), Well . . . . .	.284
Lowell, Boulevard wells (tubular) . . . . .	.342
Waltham, Old well . . . . .	.369
Amesbury, Tubular wells . . . . .	.405

*Albuminoid Ammonia in Surface Waters*

[Parts in 100,000]

West Stockbridge, East Mountain Reservoir . . . . .	.0008
Egremont (South), Goodale Brook . . . . .	.0013
Williamstown, Paul Brook . . . . .	.0015
Hatfield, Running Gutter Brook Reservoir . . . . .	.0019
West Springfield, Bear Hole Brook, filtered . . . . .	.0020
Ashburnham, Upper Naukeag Lake . . . . .	.0021
Cheshire, Thunder Brook . . . . .	.0023



*Albuminoid Ammonia in Surface Waters — Continued*

[Parts in 100,000]

Blandford (Fire District), Freeland Brook	.0024
Deerfield (South Deerfield Water Supply District), Roaring Brook	.0024
Shelburne (Shelburne Falls Fire District), Fox Brook	.0024
Williamstown, Rattlesnake Brook	.0024
Lenox, Woolsey Reservoir	.0025
Cheshire, Kitchen Brook	.0027
Chicopee, Morton Brook	.0028
Northfield, Reservoir	.0028
Lee, Coddling Brook Upper Reservoir	.0029
Colrain (Fire District No. 1), Mountain Brook Reservoir	.0031
Lee, Coddling Brook Lower Reservoir	.0031
Adams (Fire District), Bassett Brook	.0032
Springfield, Westfield Little River, filtered	.0032
Milford, Charles River, filtered	.0033
North Adams, Notch Brook Reservoir	.0034
Pittsfield, Sacket Brook	.0035
North Adams, Broad Brook	.0036
Lenox, Lower Root Reservoir	.0041
Hadley (Water Supply District), Hart's Brook Reservoir	.0044
Colrain (Griswoldville), McClellan Reservoir	.0046
Williamsburg, Reservoir	.0048
Huntington (Fire District), Cold Brook Reservoir	.0053
Westfield, Tillotson Brook Reservoir	.0053
West Springfield, Bear Hole Brook	.0053
Dalton (Fire District), Egypt Brook Reservoir	.0054
Orange, Reservoir	.0054
Russell, Black Brook	.0054
Scituate, Outlet of filter	.0054
Northampton, Mountain Street Reservoir	.0055
Montague, Lake Pleasant	.0056
Pittsfield, Hathaway Brook	.0056
Gloucester, Haskell Brook Reservoir	.0059
Greenfield, Glen Brook Lower Reservoir	.0060
Hinsdale (Fire District), Reservoir	.0062
Falmouth, Long Pond	.0063
North Adams, Mount Williams Reservoir	.0064
Metropolitan Water District, Tap in Revere	.0066
Dalton, Cady Brook	.0066
Maynard, White Pond	.0066
Metropolitan Water District, Tap in Quincy	.0067
Stoughton, Muddy Pond Brook	.0067
Adams (Fire District), Dry Brook	.0068
Ashfield, Bear Swamp Brook	.0070
South Hadley (Fire District No. 1), Buttery Brook Reservoir	.0070
Leominster, Fall Brook Reservoir	.0072
Winchester, South Reservoir	.0072
Westfield, Granville Reservoir	.0072
Metropolitan Water District, Tap in State House	.0074
Pittsfield, Ashley Brook	.0074
Plymouth, Great South Pond	.0074
Weymouth, Great Pond	.0075
Lincoln, Sandy Pond	.0076
Metropolitan Water District, Wachusett Reservoir, lower end	.0078
Southbridge, Hatchet Brook Reservoir No. 3	.0079
Fitchburg, Falulah Brook	.0080
Metropolitan Water District, Spot Pond	.0082
Metropolitan Water District, Sudbury Reservoir	.0083
Clinton, Tap in town	.0083
Fall River, North Watuppa Lake	.0083
Metropolitan Water District, Weston Reservoir	.0084
Blackstone, Tap (supply from Woonsocket, R. I.)	.0084
Chester (Fire District), Austin Brook Reservoir	.0084
Fitchburg, Wachusett Lake	.0084
Metropolitan Water District, Chestnut Hill Reservoir	.0088
Northampton, Middle Reservoir	.0088
Wareham (Onset), Jonathan Pond	.0088
Athol, Outlet of filter	.0089
Hingham, Accord Pond	.0090
Manchester, Gravel Pond	.0090
Pittsfield, Ashley Lake	.0090
Spencer, Shaw Pond	.0090
Holyoke, Wright and Ashley Pond	.0091
Leominster, Morse Reservoir	.0091
Brockton, Silver Lake	.0092
Barre, Reservoir	.0093
Palmer (Fire District No. 1), Lower Reservoir	.0094
Plymouth, Little South Pond	.0094
Amherst, Amethyst Brook large reservoir	.0095
Holyoke, Whiting Street Reservoir	.0096
Westfield, Montgomery Reservoir	.0096
Greenfield, Glen Brook Upper Reservoir	.0098
Southbridge, Hatchet Brook Reservoir No. 4	.0098
Stockbridge, Lake Averic	.0098
Worcester, Mann Reservoir	.0098
Gardner, Crystal Lake	.0099
Worcester, Kent Reservoir	.0100
Concord, Nagog Pond	.0102
Fitchburg, Meetinghouse Pond	.0103

*Albuminoid Ammonia in Surface Waters — Concluded*

[Parts in 100,000]

Lee, Basin Pond Brook . . . . .	.0103
Winchester, North Reservoir . . . . .	.0103
Metropolitan Water District, Framingham Reservoir No. 3 . . . . .	.0104
Abington, Big Sandy Pond . . . . .	.0104
Haverhill, Pentucket Lake . . . . .	.0104
South Hadley (Fire District No. 1), Leaping Well Reservoir . . . . .	.0105
Holyoke, Fomer Reservoir . . . . .	.0106
Lawrence, Merrimack River, filtered . . . . .	.0106
Athol, Buckman Brook Reservoir . . . . .	.0107
Gloucester, Wallace Reservoir . . . . .	.0107
Holyoke, High Service Reservoir . . . . .	.0107
Haverhill, Crystal Lake . . . . .	.0108
New Bedford, Great Quittacas Pond . . . . .	.0108
Worcester, Leicester Reservoir . . . . .	.0108
Great Barrington (Fire District), East Mountain Reservoir . . . . .	.0109
Taunton, Assawompsett Pond . . . . .	.0109
Hudson, Gates Pond . . . . .	.0112
Taunton, Elder's Pond . . . . .	.0112
New Bedford, Little Quittacas Pond . . . . .	.0113
Metropolitan Water District, Wachusett Reservoir, upper end . . . . .	.0114
Metropolitan Water District, Ashland Reservoir . . . . .	.0115
Andover, Haggett's Pond . . . . .	.0115
Peabody, Spring Pond . . . . .	.0115
Metropolitan Water District, Hopkinton Reservoir . . . . .	.0117
Dalton (Fire District), Windsor Reservoir . . . . .	.0117
Haverhill, Kenos Lake . . . . .	.0117
Chester (Fire District), Horn Pond . . . . .	.0118
Palmer (Fire District No. 1), Upper Reservoir . . . . .	.0118
North Andover, Great Pond . . . . .	.0119
Gloucester, Dike's Brook Reservoir . . . . .	.0121
Worcester, Upper Holden Reservoir . . . . .	.0121
Pittsfield, Mill Brook . . . . .	.0122
Athol, Inlet of filter . . . . .	.0123
Haverhill, Millvale Reservoir . . . . .	.0123
Haverhill, Johnson's Pond . . . . .	.0124
Metropolitan Water District, Lake Cochituate . . . . .	.0125
Worcester, Bottomly Reservoir . . . . .	.0125
Worcester, Lower Holden Reservoir . . . . .	.0125
Worcester, Kendall Reservoir . . . . .	.0127
Haverhill, Lake Saltonstall . . . . .	.0129
Randolph, Great Pond . . . . .	.0131
Fitchburg, Scott Reservoir . . . . .	.0132
Marlborough, Millham Brook Reservoir . . . . .	.0134
Nantucket, Wannacomet Pond . . . . .	.0134
Winchester, Middle Reservoir . . . . .	.0134
Marlborough, Lake Williams . . . . .	.0136
Amherst, Amethyst Brook, small reservoir . . . . .	.0137
Holyoke, White Reservoir . . . . .	.0137
Leominster, Haynes Reservoir . . . . .	.0137
Lynn, Birch Reservoir . . . . .	.0137
Salem, Wenham Lake . . . . .	.0139
Lynn, Breed's Reservoir . . . . .	.0141
Ipswich, Dow's Brook Reservoir . . . . .	.0143
Great Barrington (Housatonic), Long Pond . . . . .	.0144
Rutland, Muschopauge Lake . . . . .	.0144
Peabody, Suntang Lake . . . . .	.0146
Salem, Ipswich River at pumping station . . . . .	.0146
Cambridge, Stony Brook Reservoir . . . . .	.0147
Cambridge, Fresh Pond . . . . .	.0148
Pittsfield, Farnham Reservoir . . . . .	.0148
Rockport, Cape Pond . . . . .	.0149
Danvers, Swan Pond . . . . .	.0152
Fitchburg, Ashby Reservoir . . . . .	.0152
Cambridge, Lower Hobbs Brook Reservoir . . . . .	.0157
Northborough, Lower Reservoir . . . . .	.0158
Brookfield, Cooley Hill Reservoir . . . . .	.0159
Chicopee, Cooley Brook . . . . .	.0163
Wakefield, Crystal Lake . . . . .	.0164
Metropolitan Water District, Framingham Reservoir No. 2 . . . . .	.0166
Hingham, Fulling Mill Pond . . . . .	.0168
Northborough, Upper Reservoir . . . . .	.0168
Lynn, Walden Reservoir . . . . .	.0169
Norwood, Buckmaster Pond . . . . .	.0171
Cambridge, Upper Hobbs Brook Reservoir . . . . .	.0181
Ipswich, Bull Brook . . . . .	.0188
Athol, Phillipston Reservoir . . . . .	.0189
North Brookfield, Doane Pond . . . . .	.0196
Athol, Thousand Acre Meadow Brook . . . . .	.0198
Danvers, Middleton Pond . . . . .	.0201
Worcester, Pine Hill Reservoir . . . . .	.0211
Salem, Longham Reservoir . . . . .	.0220
North Brookfield, North Pond . . . . .	.0231
Lynn, Hawkes Reservoir . . . . .	.0232
Scituate, Inlet of filter . . . . .	.0278
Newburyport, Artichoke River . . . . .	.0309

*Color of Surface Waters*

[Parts in 100,000]

Falmouth, Long Pond	.00
West Stockbridge, East Mountain Reservoir	.00
Ashburnham, Upper Naukeag Lake	.01
Cheshire, Kitchen Brook	.01
Egremont (South), Goodale Brook	.01
Russell, Black Brook	.01
Scituate, Outlet of filter	.01
West Springfield, Bear Hole Brook, filtered	.02
Abington, Big Sandy Pond	.02
Adams (Fire District), Bassett Brook	.02
Greenfield, Glen Brook Upper Reservoir	.02
Lee, Coddington Brook Lower Reservoir	.02
Lenox, Woolsey Reservoir	.02
Lincoln, Sandy Pond	.02
North Adams, Mount Williams Reservoir	.02
Plymouth, Little South Pond	.02
Plymouth, Great South Pond	.02
Wareham (Onset), Jonathan Pond	.03
Brookfield, Cooley Hill Reservoir	.03
Cheshire, Thunder Brook	.03
Colrain (Griswoldville), McClellan Reservoir	.03
Colrain (Fire District No. 1), Mountain Brook Reservoir	.03
Fall River, North Watuppa Lake	.03
Fitchburg, Meetinghouse Pond	.03
Greenfield, Glen Brook Lower Reservoir	.03
Leominster, Fall Brook Reservoir	.03
Maynard, White Pond	.03
North Adams, Notch Brook Reservoir	.03
Shelburne (Shelburne Falls Fire District), Fox Brook	.03
South Hadley (Fire District No. 1), Leaping Well Reservoir	.03
Spencer, Shaw Pond	.03
Williamstown, Paul Brook	.03
Winchester, North Reservoir	.04
Barre, Reservoir	.04
Blandford (Fire District), Freeland Brook	.04
Deerfield (South Deerfield Water Supply District), Roaring Brook	.04
Fitchburg, Scott Reservoir	.04
Haverhill, Pentucket Lake	.04
Lenox, Lower Root Reservoir	.04
Montague, Lake Pleasant	.04
Nantucket, Wannacomet Pond	.04
West Springfield, Bear Hole Brook	.04
Williamstown, Rattlesnake Brook	.04
Worcester, Kent Reservoir	.04
Worcester, Mann Reservoir	.05
Andover, Haggett's Pond	.05
Chicopee, Morton Brook	.05
Concord, Nagog Pond	.05
Fitchburg, Wachusett Lake	.05
Great Barrington (Housatonic), Long Pond	.05
Hadley (Water Supply District), Hart's Brook Reservoir	.05
Haverhill, Lake Saltonstall	.05
Hinsdale (Fire District), Reservoir	.05
Holyoke, Whiting Street Reservoir	.05
Holyoke, High Service Reservoir	.05
Hudson, Gates Pond	.05
Lee, Coddington Brook Upper Reservoir	.05
Leominster, Morse Reservoir	.05
Manchester, Gravel Pond	.05
Marlborough, Lake Williams	.05
North Adams, Broad Brook	.05
Northampton, Mountain Street Reservoir	.06
Metropolitan Water District, Wachusett Reservoir, lower end	.06
Brockton, Silver Lake	.06
Clinton, Tap in town	.06
Great Barrington (Fire District), East Mountain Reservoir	.06
Holyoke, Wright and Ashley Pond	.06
Taunton, Elder's Pond	.06
Winchester, South Reservoir	.07
Metropolitan Water District, Tap in Revere	.07
Metropolitan Water District, Tap in Quincy	.07
Cambridge, Fresh Pond	.07
Gardner, Crystal Lake	.07
Hatfield, Running Gutter Brook Reservoir	.07
Peabody, Spring Pond	.07
Williamsburg, Reservoir	.07
Winchester, Middle Reservoir	.08
Metropolitan Water District, Lake Cochituate	.08
Metropolitan Water District, Weston Reservoir	.08
Metropolitan Water District, Spot Pond	.08
Cambridge, Lower Hobbs Brook Reservoir	.08
Chester (Fire District), Horn Pond	.08
Haverhill, Crystal Lake	.08
Pittsfield, Ashley Brook	.08
Rutland, Mushchopauge Lake	.08
Springfield, Westfield Little River, filtered	.09
Metropolitan Water District, Sudbury Reservoir	.09
Metropolitan Water District, Chestnut Hill Reservoir	.09
Chester (Fire District), Austin Brook Reservoir	.09
Haverhill, Johnson's Pond	.09



*Color of Surface Waters—Concluded*

[Parts in 100,000]

Haverhill, Kenoza Lake	.09
Leominster, Haynes Reservoir	.09
Palmer (Fire District No. 1), Upper Reservoir	.09
Pittsfield, Ashley Lake	.09
Pittsfield, Hathaway Brook	.09
Pittsfield, Sacket Brook	.09
Worcester, Leicester Reservoir	.09
Metropolitan Water District, Framingham Reservoir No. 3	.10
Metropolitan Water District, Tap in State House	.10
Palmer (Fire District No. 1), Lower Reservoir	.10
Worcester, Lower Holden Reservoir	.10
Fitchburg, Falulah Brook	.11
North Andover, Great Pond	.11
Northfield, Reservoir	.11
Southbridge, Hatchet Brook Reservoir No. 3	.11
South Hadley (Fire District No. 1), Buttery Brook Reservoir	.11
Stockbridge, Lake Averic	.11
Holyoke, White Reservoir	.12
Westfield, Tillotson Brook Reservoir	.12
Worcester, Upper Holden Reservoir	.12
Hingham, Accord Pond	.13
Norwood, Buckmaster Pond	.13
Stoughton, Muddy Pond Brook	.13
Taunton, Assawompsett Pond	.13
Worcester, Kendall Reservoir	.13
Amherst, Amethyst Brook small reservoir	.14
Blackstone, Tap (Supply from Woonsocket, R. I.)	.14
Gloucester, Haskell Brook Reservoir	.14
Wakefield, Crystal Lake	.14
Huntington (Fire District), Cold Brook Reservoir	.15
New Bedford, Little Quittacas Pond	.16
Weymouth, Great Pond	.16
Athol, Buckman Brook Reservoir	.17
Milford, Charles River, filtered	.17
Rockport, Cape Pond	.17
Dalton (Fire District), Egypt Brook Reservoir	.18
Danvers, Swan Pond	.18
Fitchburg, Ashby Reservoir	.18
Ipswich, Dow's Brook Reservoir	.18
Lynn, Birch Pond	.18
Southbridge, Hatchet Brook Reservoir No. 4	.19
Adams (Fire District), Dry Brook	.20
Ashfield, Bear Swamp Brook	.20
Cambridge, Upper Hobbs Brook Reservoir	.20
Northampton, Middle Reservoir	.20
Orange, Reservoir	.20
Worcester, Pine Hill Reservoir	.20
Athol, Outlet of filter	.21
Chicopee, Cooley Brook	.21
Holyoke, Fomer Reservoir	.21
Randolph, Great Pond	.21
Westfield, Granville Reservoir	.21
Marlborough, Millham Brook Reservoir	.22
Dalton (Fire District), Cady Brook	.23
Cambridge, Stony Brook Reservoir	.24
Gloucester, Wallace Reservoir	.24
North Brookfield, Doane Pond	.24
North Brookfield, North Pond	.24
Worcester, Bottomly Reservoir	.24
Metropolitan Water District, Wachusett Reservoir, upper end	.25
Metropolitan Water District, Hopkinton Reservoir	.25
Peabody, Suntaug Lake	.25
Danvers, Middleton Pond	.26
New Bedford, Great Quittacas Pond	.26
Metropolitan Water District, Ashland Reservoir	.27
Salem, Wenham Lake	.27
Dalton (Fire District), Windsor Reservoir	.28
Lynn, Breed's Reservoir	.29
Pittsfield, Mill Brook	.29
Hingham, Fulling Mill Pond	.30
Metropolitan Water District, Framingham Reservoir No. 2	.32
Athol, Phillipston Reservoir	.32
Athol, Inlet of filter	.34
Lawrence, Merrimack River, filtered	.34
Lee, Basin Pond Brook	.35
Westfield, Montgomery Reservoir	.36
Haverhill, Millvale Reservoir	.37
Newburyport, Artichoke River	.37
Pittsfield, Farnham Reservoir	.37
Gloucester, Dikey's Brook Reservoir	.39
Amherst, Amethyst Brook large reservoir	.40
Northborough, Lower reservoir	.45
Lynn, Walden Reservoir	.52
Salem, Ipswich River at pumping station	.58
Northborough, Upper reservoir	.62
Salem, Longham Reservoir	.70
Lynn, Hawkes Reservoir	.74
Ipswich, Bull Brook	1.01
Scituate, Inlet of filter	1.01
Athol, Thousand Acre Meadow Brook	1.03

*Hardness of Surface Waters*

[Parts in 100,000]

Hinsdale (Fire District), Reservoir	0.4
Abington, Big Sandy Pond	0.5
Falmouth, Long Pond	0.5
Leominster, Morse Reservoir	0.5
Leominster, Fall Brook Reservoir	0.5
Plymouth, Little South Pond	0.5
Plymouth, Great South Pond	0.5
Taunton, Assawompsett Pond	0.5
Taunton, Elder's Pond	0.5
Wareham (Onset), Jonathan Pond	0.5
Westfield, Montgomery Reservoir	0.5
Brockton, Silver Lake	0.6
Fall River, North Watuppa Lake	0.6
Fitchburg, Ashby Reservoir	0.6
Gloucester, Haskell Brook Reservoir	0.6
South Hadley (Fire District No. 1), Leaping Well Reservoir	0.6
Amherst, Amethyst Brook large reservoir	0.7
Ashburnham, Upper Naukeag Lake	0.7
Concord, Nagog Pond	0.7
Fitchburg, Scott Reservoir	0.7
Fitchburg, Wachusett Lake	0.7
Fitchburg, Falulah Brook	0.7
Gloucester, Dike's Brook Reservoir	0.7
Hingham, Accord Pond	0.7
Leominster, Haynes Reservoir	0.7
Maynard, White Pond	0.7
New Bedford, Little Quittacas Pond	0.7
New Bedford, Great Quittacas Pond	0.7
North Brookfield, North Pond	0.7
Orange, Reservoir	0.7
Palmer (Fire District No. 1), Upper Reservoir	0.7
Spencer, Shaw Pond	0.7
Stoughton, Muddy Pond Brook	0.7
Westfield, Granville Reservoir	0.7
Weymouth, Great Pond	0.7
Fitchburg, Meetinghouse Pond	0.8
Gloucester, Wallace Reservoir	0.8
Lincoln, Sandy Pond	0.8
North Brookfield, Doane Pond	0.8
Southbridge, Hatchet Brook Reservoir No. 3	0.9
Westfield, Tiltonson Brook Reservoir	0.9
Worcester, Kendall Reservoir	0.9
Metropolitan Water District, Hopkinton Reservoir	1.0
Amherst, Amethyst Brook small reservoir	1.0
Athol, Buckman Brook Reservoir	1.0
Blandford (Fire District), Freeland Brook	1.0
Montague, Lake Pleasant	1.0
Russell, Black Brook	1.0
Southbridge, Hatchet Brook Reservoir No. 4	1.0
Worcester, Upper Holden Reservoir	1.0
Worcester, Lower Holden Reservoir	1.0
Athol, Phillipston Reservoir	1.1
Brookfield, Cooley Hill Reservoir	1.1
Dalton (Fire District), Egypt Brook Reservoir	1.1
Huntington (Fire District), Cold Brook Reservoir	1.1
Palmer (Fire District No. 1), Lower Reservoir	1.1
Metropolitan Water District, Wachusett Reservoir, lower end	1.2
Athol, Outlet of filter	1.2
Northborough, Upper Reservoir	1.2
Rutland, Muschopauge Lake	1.2
Metropolitan Water District, Sudbury Reservoir	1.3
Metropolitan Water District, Tap in State House	1.3
Clinton, Tap in town	1.3
Holyoke, Fomer Reservoir	1.3
Worcester, Pine Hill Reservoir	1.3
Metropolitan Water District, Wachusett Reservoir, upper end	1.4
Metropolitan Water District, Framingham Reservoir No. 3	1.4
Metropolitan Water District, Ashland Reservoir	1.4
Metropolitan Water District, Chestnut Hill Reservoir	1.4
Metropolitan Water District, Weston Reservoir	1.4
Metropolitan Water District, Spot Pond	1.4
Metropolitan Water District, Tap in Revere	1.4
Athol, Inlet of filter	1.4
Haverhill, Crystal Lake	1.4
Hudson, Gates Pond	1.4
Barre, Reservoir	1.5
Chicopee, Cooley Brook	1.5
Manchester, Gravel Pond	1.5
Nantucket, Wannacomet Pond	1.5
Northborough, Lower Reservoir	1.5
Northfield, Reservoir	1.5
Springfield, Westfield Little River, filtered	1.5
Worcester, Kent Reservoir	1.5
Worcester, Leicester Reservoir	1.5
Metropolitan Water District, Tap in Quincy	1.6
Andover, Haggett's Pond	1.6
Milford, Charles River, filtered	1.6
Worcester, Mann Reservoir	1.6
Athol, Thousand Acre Meadow Brook	1.7
Blackstone, Tap (supply from Woonsocket, R. I.)	1.7

*Hardness of Surface Waters — Concluded*

[Parts in 100,000]

Chester (Fire District), Austin Brook Reservoir	1.7
Chester, Horn Pond	1.7
Chicopee, Morton Brook	1.7
Holyoke, High Service Reservoir	1.7
Holyoke, White Reservoir	1.7
Lee, Basin Pond Brook	1.7
South Hadley (Fire District No. 1), Buttery Brook Reservoir	1.7
Winchester, South Reservoir	1.7
Winchester, Middle Reservoir	1.7
Danvers, Middleton Pond	1.8
Hadley (Water Supply District), Hart's Brook Reservoir	1.8
Hingham, Fulling Mill Pond	1.8
Norwood, Buckmaster Pond	1.8
Rockport, Cape Pond	1.8
Scituate, Inlet of filter	1.8
Williamsburg, Reservoir	1.8
Winchester, North Reservoir	1.8
Danvers, Swan Pond	1.9
Northampton, Middle Reservoir	1.9
Northampton, Mountain Street Reservoir	1.9
North Andover, Great Pond	1.9
Pittsfield, Farnham Reservoir	1.9
Randolph, Great Pond	1.9
Metropolitan Water District, Framingham Reservoir No. 2	2.0
Gardner, Crystal Lake	2.0
Haverhill, Pentucket Lake	2.0
Lawrence, Merrimack River, filtered	2.0
Peabody, Suntaug Lake	2.0
Pittsfield, Mill Brook	2.0
Ipswich, Dow's Brook Reservoir	2.1
Marlborough, Lake Williams	2.1
Peabody, Spring Pond	2.1
Worcester, Bottomly Reservoir	2.1
Holyoke, Wright and Ashley Pond	2.2
Lynn, Birch Reservoir	2.2
Haverhill, Kenos Lake	2.3
Haverhill, Millvale Reservoir	2.3
Lynn, Breed's Reservoir	2.3
Marlborough, Millham Brook Reservoir	2.3
Pittsfield, Ashley Lake	2.3
Scituate, Outlet of filter	2.3
Dalton, Windsor Reservoir	2.4
North Adams, Broad Brook	2.4
Cambridge, Lower Hobbs Brook Reservoir	2.5
Egremont (South), Goodale Brook	2.5
Cambridge, Upper Hobbs Brook Reservoir	2.6
Haverhill, Johnson's Pond	2.6
Ipswich, Bull Brook	2.6
Lynn, Walden Reservoir	2.6
Dalton, Cady Brook	2.7
Hatfield, Running Gutter Brook Reservoir	2.7
Haverhill, Lake Saltonstall	2.8
Lee, Coddling Brook Upper Reservoir	2.8
Lee, Coddling Brook Lower Reservoir	2.8
Wakefield, Crystal Lake	2.8
Adams (Fire District), Bassett Brook	2.9
Metropolitan Water District, Lake Cochituate	3.0
Cambridge, Stony Brook Reservoir	3.0
Holyoke, Whiting Street Reservoir	3.0
Newburyport, Artichoke River	3.0
Salem, Wenham Lake	3.0
Ashfield, Bear Swamp Brook	3.2
Salem, Longham Reservoir	3.3
West Stockbridge, East Mountain Reservoir	3.3
Great Barrington (Fire District), East Mountain Reservoir	3.4
Williamstown, Paul Brook	3.4
Shelburne, Fox Brook	3.6
Greenfield, Glen Brook Lower Reservoir	3.7
Lynn, Hawkes Reservoir	3.8
Deerfield (South Deerfield Water Supply District), Roaring Brook	3.9
Adams (Fire District), Dry Brook	4.0
Greenfield, Glen Brook Upper Reservoir	4.0
Lenox, Woolsey Reservoir	4.0
Pittsfield, Ashley Brook	4.0
West Springfield, Bear Hole Brook, filtered	4.3
West Springfield, Bear Hole Brook	4.4
Cambridge, Fresh Pond	4.5
Cheshire, Kitchen Brook	4.5
Stockbridge, Lake Averic	4.6
Colrain (Griswoldville), McClellan Reservoir	4.7
Lenox, Lower Root Reservoir	4.9
Salem, Ipswich River at Pumping Station	4.9
Cheshire, Thunder Brook	5.3
North Adams, Mount Williams Reservoir	5.3
Pittsfield, Sacket Brook	5.8
Colrain (Fire District No. 1), Mountain Brook Reservoir	5.9
Great Barrington (Housatonic), Long Pond	6.0
North Adams, Notch Brook Reservoir	6.2
Pittsfield, Hathaway Brook	6.8
Williamstown, Rattlesnake Brook	9.0



## WATER SUPPLY STATISTICS

The following table is arranged to show the various cities and towns in the Commonwealth and the character of the works of those that are now supplied wholly or in part with water from public works, and the total valuation of assessed estate of the municipality.

CITY OR TOWN	Date of Introduction	Source of Supply	Total Valuation of Assessed Estate April 1, 1930	Population 1930 Census	Pumping or Gravity	Services (1930)		Treatment
						Number	Per Cent Metered	
Abington	1887	Great Sandy Bottom Pond	\$5,769,069	5,872	P.	1,450	100	—
Action	—	—	3,729,405	2,482	—	—	—	—
West and South Water Supply District	1912	Tubular Wells	—	—	P.	561	98	—
Acustnet	1916	New Bedford Water Supply	3,858,445	4,092	—	—	—	—
Adams	—	—	12,712,745	12,697	—	—	—	—
Adams Fire District	1874	Dry Brook Reservoir	—	—	G.	2,186	3	Chlorination
—	—	Bassett Brook Reservoir	—	—	G.	—	—	None
—	—	Tubular Wells	—	—	P.	—	—	None
Agawam	1877	Springfield Water Supply	9,442,046	7,095	—	—	—	—
Alford	—	—	246,064	200	—	—	—	—
Amesbury	1885	Tubular Wells	11,622,362	11,899	P.	2,100	21	Iron Removal — Aeration, Coke Trickler Slow Sand Filtration
Amherst	—	—	9,329,232	5,888	—	—	—	—
Amherst Water Co.	1880	Reservoirs on Amethyst Brook	—	—	—	—	—	—
Andover	1890	Haggett's Pond	17,063,808	9,969	G.	2,351	97	Chlorination
Arlington	1872	Metropolitan Water Supply	60,917,100	36,094	P.	6,847	100	—
Ashburnham	1870	Upper Naukeag Lake	1,681,194	2,070	P.	375	100	—
Ashby	—	—	1,046,536	982	—	—	—	—
Ashfield	—	—	1,183,927	860	—	—	—	—
Ashfield Water Co.	1904	Bear Swamp Reservoir	—	—	G.	77	0	—
Ashland	1911	Tubular Wells	2,658,260	2,397	P.	383	100	Mechanical Sand Filtration
Athol	1875	Phillipston Reservoir	11,010,975	10,672	G.	1,769	89	Slow Sand Filtration
—	—	1000 Acre Reservoir	—	—	G.	—	—	Slow Sand Filtration
—	—	Newton Reservoir	—	—	G.	—	—	—
—	—	Lake Ellis (Emergency)	—	—	P.	—	—	—
ATTLEBORO	1873	Dug Wells and Filter Gallery	25,525,465	21,769	P.	3,946	93	—
—	—	Tubular Wells	—	—	P.	—	—	—
Auburn	—	—	5,996,530	6,147	—	—	—	—
Auburn Water Co.	1920	Tubular Wells	—	—	P.	476	0	—
Avon	1890	Dug and Tubular Wells	1,893,425	2,414	P.	536	70	—
Ayer	1887	Dug and Tubular Wells	3,615,825	3,080	P.	703	88	—
Barnstable	—	—	22,284,120	7,271	—	—	—	—
Barnstable Water Co.	1912	Tubular Wells	—	—	P.	1,241	4	—
Barre	1895	Reservoir on Allen Hill	2,990,070	3,510	G.	200	4	—
Becket	—	—	856,922	672	—	—	—	—
Bedford	—	Dug and Tubular Wells	2,862,001	2,603	P.	418	68	—
Belchertown	1909	—	1,462,080	3,139	P.	—	—	—
Belchertown Water District	1925	Tubular Wells	—	—	P.	135	100	—
Bellingham	—	—	2,636,912	3,189	—	—	—	—
Belmont	1887	Metropolitan Water Supply	45,168,065	21,748	—	—	—	—
Berkley	—	—	914,821	1,120	—	4,177	100	—
Berlin	—	—	1,019,897	1,075	—	—	—	—
Bernardston	—	—	811,045	893	—	—	—	—

BEVERLY	1868	Wenham Lake	48,438,400	25,086	P.	5,533	91	Chlorination
		Longham Reservoir	—	—	P.	—	—	Chlorination
		Ipswich River	—	—	P.	—	—	—
Billerica	1898	Tubular Wells	9,274,735	5,880	P.	980	100	—
Blackstone	1911	Woonsocket R. I. Water Supply	2,380,910	4,674	P.	—	—	—
Blandford	1909	Freeland Brook Reservoirs	885,435	545	P.	40	100	—
Bolton	—	—	1,163,415	764	—	—	—	—
Boston	1848	Metropolitan Water Supply	1,972,148,200	781,188	—	100,000	100	—
Bourne	—	—	9,385,297	2,895	—	—	—	—
Monument Beach Water Co.	1916	Tubular Wells	—	—	P.	104	0	—
Sagamore — Keith Car Works.	1909	Tubular Wells	—	—	P.	120	0	—
Boxborough	—	—	385,861	312	—	—	—	—
Bosford	—	—	1,104,644	652	—	—	—	—
Boylston	—	—	888,165	1,097	—	—	—	—
Braintree	1887	Great Pond	24,838,925	15,712	P.	4,170	88	Chlorination
Brewster	—	—	2,120,920	769	—	—	—	—
Bridgewater	1888	Tubular Wells	5,280,824	9,055	P.	1,093	100	—
Brimfield	—	—	1,047,280	884	—	—	—	—
BROCKTON	1880	Silver Lake	79,278,450	63,797	P.	11,842	97	—
—	—	Avon Reservoir (Emergency)	—	—	—	—	—	—
Brookfield	1889	Cooley Hill Reservoir	1,291,567	1,352	G.	225	82	None
—	—	Dug and Tubular Wells	—	—	—	—	—	Chlorination
Brookline	1875	Tubular Wells	170,305,100	47,490	P.	7,530	100	Slow Sand Filtration, Aeration, Coke Filtration
Buckland	—	—	2,690,754	1,497	—	—	—	—
Burlington	—	—	2,592,442	1,722	—	—	—	—
CAMBRIDGE	1856	Stony Brook Reservoir	190,753,300	113,643	P.	16,862	55	Coagulation, Mechanical Sand Filtration, Aeration, Chlorination
—	—	Hobbs Brook Reservoirs	—	—	P.	—	—	Coagulation, Mechanical Sand Filtration, Aeration, Chlorination
—	—	Fresh Pond	—	—	P.	—	—	Coagulation, Mechanical Sand Filtration, Aeration, Chlorination
Canton	1889	Dug and Tubular Wells	8,677,170	5,816	P.	1,287	67	Coagulation, Mechanical Sand Filtration, Aeration, Chlorination
Carlisle	—	—	1,003,484	869	—	—	—	—
Carver	—	—	3,010,435	1,381	—	—	—	—
Charlmont	—	—	1,018,493	816	—	—	—	—
Charlton	—	—	1,596,640	2,154	—	—	—	—
Chatham	—	—	5,653,250	1,931	—	—	—	—
Chatham Water Co.	1929	Filter Gallery at White Pond	7,090,615	7,022	P.	—	—	—
Chelmsford	—	—	—	—	—	—	—	—
N. Chelmsford Fire District	1907	Tubular Wells	—	—	P.	391	100	—
Chelmsford Water District	1914	Tubular Wells	—	—	P.	661	87	—
CHELSEA	1867	Metropolitan Water Supply	56,431,350	45,816	P.	5,846	100	—
Cheshire	—	—	1,359,479	1,697	—	—	—	—
Cheshire Water Co.	1876	Thunder Brook Reservoir	—	—	G.	—	—	—
—	—	Kitchen Brook Reservoir	—	—	G.	—	—	—
Chester	—	Austin Brook Reservoir	1,386,005	1,464	G.	185	0	—
Chester Fire District	1893	Horn Pond	—	—	G.	—	—	—
Chesterfield	—	—	568,008	420	—	—	—	—
CHICPEE	1845	Morton Brook Reservoir	50,869,160	43,930	P.	6,200	93	—
—	—	Cooley Brook Reservoir	—	—	P.	—	—	—
Chilmark	—	—	610,317	252	—	—	—	—
Clarksburg	—	—	691,276	1,296	—	—	—	—

City or Town	Date of In- troduc- tion	Source of Supply	Total Valuation of Assessed Estate April 1, 1930	Popu- lation 1930 Census	Pumping or Gravity	Services (1930)		Treatment
						Number	Per Cent Metered	
Clinton	1882	Upper, Lower Lynde's Reservoirs, Spring Basin Heywood Pond Wachusett Reservoir (Emergency)	\$15,498,251	12,817	G.	2,200	97	-
Cohasset	-	Dug and Tubular Wells	-	-	G.	-	-	-
Cohasset Water Co.	1886	Filter Gallery near Lilly Pond	10,733,522	3,083	P.	1,004	4	-
Colrain	-	Mountain Brook Reservoir	1,336,635	1,391	P.	-	-	-
Colrain Fire District, No. 1	1902	McClellan Brook Reservoir	-	-	G.	-	-	-
Griswoldville Mfg. Co.	1901	Sandy Pond	8,580,010	7,477	G.	1,585	6	-
Concord	1873	Nagog Pond	926,536	900	G.	-	-	-
Conway	-	Tubular Wells	484,245	531	P.	-	-	-
Cumington	1916	Beals Brook Reservoir	5,564,942	4,220	G.	998	0	-
Dalton	1884	Egypt Brook Reservoir	-	-	G.	-	-	-
Dalton Fire District	-	Cady Brook Reservoir	-	-	G.	-	-	-
Dana	-	May Brook Reservoir	-	-	G.	-	-	-
Danvers	1876	Anthony Brook Reservoir	792,712	505	G.	-	-	-
Dartmouth	1915	Windsor Reservoir (Emergency)	12,066,950	12,957	P.	-	-	-
Dedham	-	Middleton Pond	-	-	P.	-	-	-
Dedham Water Co.	1881	Swan Pond	12,318,675	8,878	-	-	-	-
Deerfield	-	New Bedford Water Supply	24,960,775	15,136	P.	3,448	96	-
Deerfield Water Supply District	1903	Dug and Tubular Wells	4,649,379	2,882	P.	446	0	-
Deerfield Fire District	1911	Roaring Brook Reservoir	-	-	P.	140	13	-
Dennis	-	Dug and Tubular Wells	-	-	G.	-	-	-
Dighton	-	Springs	3,034,370	1,829	G.	-	-	-
Douglas	-	-	3,919,578	3,147	-	-	-	-
Dover	1910	Tubular Wells	1,769,285	2,195	P.	244	51	-
Dracut	-	-	3,639,036	1,195	-	-	-	-
American Woolen Co. at Collinsville	1900	-	4,032,054	6,912	-	126	0	-
Dracut Water Supply District	1906	Tubular Wells	-	-	P.	750	89	-
Dudley	1910	Tubular Wells	3,522,670	4,265	P.	422	100	-
Dunstable	1918	Dug and Tubular Wells	7,133,018	1,384	P.	21	91	-
Duxbury	-	Tubular Wells	-	1,696	P.	853	100	-
Duxbury Fire and Water District	1914	Brookton Water Supply	4,666,836	3,591	P.	166	71	-
East Bridgewater	1888	Tubular and Dug Wells	1,126,555	926	-	-	-	-
East Brookfield	1921	-	1,167,134	543	-	-	-	-
Eastham	-	Tubular Wells	14,034,956	11,323	P.	1,950	99	-
Easthampton	1870	-	3,722,920	3,327	-	545	100	-
East Longmeadow	1913	Springfield Water Supply	-	-	-	-	-	-



[illegible]

CITY OR TOWN	Date of Introduction	Source of Supply	Total Valuation of Assessed Estate April 1, 1930	Population 1930 Census	Pumping or Gravity	Services (1930)		Treatment
						Number	Per Cent Metered	
Greenfield . . . . .	1870	2 Reservoirs on Glen Brook . Filter Gallery near Green River .	\$24,115,625	15,500	P.	3,360	50	Chlorination Dual Chlorination
Greenwich . . . . .	—	. . . . .	675,540	238	P.	—	—	—
Groton . . . . .	1897	. . . . .	4,197,597	2,434	—	—	—	—
Groton Water Co. . . . .	1912	Dug Well .	—	—	P.	347	100	—
Groveland . . . . .	1915	Tubular Wells .	—	2,336	P.	556	41	—
Hadley . . . . .	—	Haverhill Water Supply .	1,652,952	2,682	—	—	—	—
Hadley Water Supply District .	1905	2 Reservoirs on Harts Brook .	3,058,913	—	G.	310	1	—
Hallifax . . . . .	—	. . . . .	1,514,359	728	—	—	—	—
Hamilton . . . . .	—	. . . . .	5,788,648	2,044	—	—	—	—
Hampden . . . . .	—	. . . . .	626,426	684	—	—	—	—
Hancock . . . . .	—	. . . . .	450,137	361	—	—	—	—
Hanover . . . . .	1930	Tubular Wells .	3,503,958	2,808	P.	395	1	—
Hanson . . . . .	1920	Supplied by Brockton; Rockland and Hanover connections in 1930	2,579,589	2,184	—	—	—	—
Hardwick . . . . .	1930	Dug Well .	2,827,585	2,460	G.	—	—	—
Hardwick Center . . . . .	1913	. . . . .	—	—	P.	—	—	—
Wheelwright . . . . .	1904	Tubular Wells .	—	—	P.	—	—	—
G. H. Gilbert Mfg. Co. . . . .	1887	Dug and Tubular Wells .	—	—	P.	—	—	—
Harvard . . . . .	—	. . . . .	2,350,997	987	—	—	—	—
Harwich . . . . .	1896	Running Gutter Brook Reservoir .	5,518,030	2,329	G.	472	0	—
Hatfield . . . . .	—	Millvale Reservoir .	2,729,356	2,476	P.	8,708	84	—
HAVERHILL . . . . .	1802	Kenoza Lake .	63,509,675	48,710	P.	—	—	—
. . . . .	—	Crystal Lake .	—	—	G.	—	—	—
. . . . .	—	Round Pond .	—	—	G.	—	—	—
. . . . .	—	Johnson's Pond .	—	—	P.	—	—	—
. . . . .	—	Chadwick Pond .	—	—	P.	—	—	—
. . . . .	—	Lake Saltonstall (Emergency)	—	—	G.	—	—	Chlorination
Hawley . . . . .	—	. . . . .	266,853	313	—	—	—	—
Heath . . . . .	—	. . . . .	381,211	331	—	—	—	—
Hingham . . . . .	—	. . . . .	15,142,005	6,657	G.	5,680	6	—
Hingham Water Co. . . . .	1880	Accord Pond .	—	—	P.	—	—	—
. . . . .	—	Collecting System at Pulling Mill Pond .	—	—	—	—	—	—
Hinsdale . . . . .	—	. . . . .	969,048	1,144	G.	—	—	—
Hinsdale Fire District . . . . .	1889	Steam Sawmill Brook Reservoir .	—	—	—	—	—	—
Holbrook . . . . .	1888	See Randolph .	3,275,859	3,353	P.	250	0	—
Holden . . . . .	1905	Muschoपाunge Pond .	3,205,614	3,871	G.	621	90	—
Holland . . . . .	—	. . . . .	233,205	137	—	—	—	—
Holliston . . . . .	—	. . . . .	3,491,851	2,864	—	—	—	—
Holliston Water Co. . . . .	1891	Dug Well .	—	—	P.	354	0	Chlorination
. . . . .	—	Tubular Wells .	—	—	—	—	—	None
. . . . .	—	Ashley Ponds .	109,963,230	56,537	P.	6,052	8	—
HOLYOKE . . . . .	1873	High Service Reservoir .	—	—	G.	—	—	—
. . . . .	—	Lower Whiting Street Reservoir .	—	—	G.	—	—	—
. . . . .	—	Upper Whiting Street Reservoir .	—	—	G.	—	—	—
. . . . .	—	Manhan Reservoir .	—	—	G.	—	—	—
. . . . .	—	White Reservoir .	—	—	G.	—	—	—

Locality	Year	Source	Capacity, Gallons	Cost, £	Notes	Remarks
Hopedale	1881	See Milford	4,146,954	2,973		
Hopkinton	1884	Tubular Wells	2,598,295	2,563		
Hubbardston	1884	Gates Pond	885,770	1,010		
Hudson	1884	Fosgate Brook	7,086,846	8,469		
Hull	1882	See Hingham	18,279,530	2,047		
Huntington	1882		1,065,280	1,242		
Huntington Fire District	1899	Cold Brook Reservoir	7,572,073	5,599		
Ipswich	1894	Tubular Wells	4,470,070	2,672		
Kingston	1886	Dow's Brook Reservoir	1,409,613	1,574		
Lakeville	1885	Bull Brook Reservoir	3,290,904	2,897		
Lancaster	1885	Tubular Wells	1,161,015	1,170		
Lancaster	1875	Clinton Water Supply	124,446,925	85,068		
LAWRENCE	1875	Merrimack River	4,966,356	4,061		
Lee	1881	Basin Pond Brook Reservoir				
Berkshire Water Co.	1881	Coddling Brook Reservoir (Upper)				
		Coddling Brook Reservoir (Lower)				
		Venetia Reservoir				
Leicester	1891	Dug Wells	3,778,265	4,445		
Leicester W. S. District	1891	Dug Wells				
Cherry Valley and Rochdale Water District	1911	Dug Wells	6,764,457	2,742		
Lenox	1875	Lower and Upper Root Reservoirs				
Lenox Water Co.	1875	Woodsey Reservoir				
LEOMINSTER	1873	Haynes Reservoir	22,785,330	21,810		
		Morse Reservoir				
		Distributing Reservoir				
		Fall Brook Reservoir				
		No-Town Reservoir				
		Metropolitan Water Supply	438,645	677		
Leverett	1884		20,768,272	9,467		
Lexington	1884		301,543	261		
Leyden	1874	Sandy Pond	2,889,140	1,493		
Lincoln	1912	Tubular Wells	2,584,200	1,447		
Littleton	1895	Springfield Water Supply	10,190,548	4,437		
Longmeadow	1872	Tubular Wells	128,249,769	100,234		
LOWELL	1872					
Ludlow	1873	Springfield Water Supply	11,234,507	8,876		
Lunenburg	1871	Hawkes Pond	2,187,815	1,923		
LYNN	1871	Breeds Pond	140,896,645	102,320		
		Walden Pond				
		Birch Pond				
		Ipswich River				
Lynnfield	1926	Lynn Water Supply	3,364,842	1,594		
MALDEN	1870	Metropolitan Water Supply	71,914,625	58,036		
Manchester	1892	Gravel Pond	12,566,513	2,636		
		Tubular and Dug Wells				



CITY OR TOWN	Date of Introduction	Source of Supply	Total Valuation of Assessed Estate April 1, 1930	Population 1930 Census	Pumping or Gravity	Services (1930)		Treatment
						Number	Per Cent Metered	
Mansfield	1888	Dug Well	\$7,652,923	6,364	P.	1,100	73	Iron Removal — Aeration, Sedimentation, Slow Sand Filtration
Marblehead	1885	Tubular and Dug Wells	20,149,608	8,668	P.	2,800	79	—
Marion	1908	Tubular Wells	5,122,968	1,638	P.	714	59	Chlorination
MARLBOROUGH	1883	Lake Williams	16,829,878	15,587	P.	2,828	89	Chlorination
Marshfield	1928	Millham Brook Reservoir	7,350,170	1,625	P.	1,407	0	—
Humarock Water Co.	1900	Tubular Wells	—	—	P.	229	0	—
Masapee	—	Tubular Wells	1,040,043	361	—	—	—	—
Mattapoisett	1913	White Pond	3,718,843	1,501	P.	654	1	—
Maynard	1889	Dug Wells	6,927,950	7,156	P.	1,468	97	—
Medfield	1889	Metropolitan Water Supply	2,811,987	4,066	P.	327	0	—
MEDFORD	1870	Tubular Wells	80,003,900	59,714	P.	10,378	100	—
Medway	1911	Metropolitan Water Supply	3,082,295	3,153	P.	685	44	—
MELROSE	1870	Metropolitan Water Supply	35,910,050	23,170	—	5,790	100	—
Mendon	—	Tubular Wells	1,302,800	1,107	P.	659	3	Chlorination
Merrimac	1875	Tubular and Dug Wells	1,943,450	2,392	P.	3,730	100	Chlorination
Methuen	1895	Wachusett Reservoir	19,147,175	21,069	G.	—	—	—
Metropolitan Water Supply*	—	Sudbury Reservoir	—	—	G.	—	—	—
—	—	Framingham Reservoir No. 1	—	—	G.	—	—	—
—	—	Framingham Reservoir No. 2	—	—	G.	—	—	—
—	—	Framingham Reservoir No. 3	—	—	G.	—	—	—
—	—	Whitehall Reservoir	—	—	G.	—	—	—
—	—	Hopkinton Reservoir	—	—	G.	—	—	—
—	—	Ashland Reservoir	—	—	G.	—	—	—
—	—	Lake Cochituate (Emergency)	—	—	G.	—	—	—
—	—	Farm Pond (Emergency)	—	—	G.	—	—	—
Middleborough	1885	Dug Well	9,194,140	8,608	P.	1,320	95	Iron Removal — Aeration, Coke Filtration, Sedimentation, Slow Sand Filtration
Middlefield	—	See Danvers	325,951	197	—	—	—	—
Middleton	1876	Dug Wells	1,843,750	1,712	P.	—	—	—
Milford	1881	Dug Wells	15,245,325	14,741	P.	3,034	100	Slow Sand Filtration, Lime
Milford Water Co.	—	Charles River	—	—	P.	—	—	Slow Sand Filtration, Lime
Millbury	1895	Dug Well	5,882,568	6,957	P.	896	0	—
Millbury Water Co.	1891	Dug Wells	2,844,208	1,738	P.	—	—	—
Millis	—	Metropolitan Water Supply	1,383,645	2,111	—	—	—	—
Millville	1885	Dug Wells and Ingalls Brook	35,292,700	16,434	—	3,814	100	—
Milton	—	Conant Brook Res. (Emergency)	951,461	218	G.	561	61	—
Monroe	1895	Lake Pleasant	3,034,405	4,918	G.	—	—	—
Monson	—	Turners Falls Fire District	10,462,250	8,081	P.	—	—	—
Montague	1887	(Turners Falls Fire District)	—	—	P.	840	5	—
Turners Falls Fire District	1886	(Turners Falls Fire District)	—	—	P.	—	—	—
Millers Falls W. S. District	1909	(Turners Falls Fire District)	—	—	P.	—	—	—
Lake Pleasant W. S. District	1911	(Turners Falls Fire District)	—	—	P.	108	0	—
Montague Village (E. L. Bartlett)	—	Springs	—	—	P.	—	—	—

\*All water pumped at Chestnut Hill and Spot Pond.

[illegible]

CITY OR TOWN	Date of In- troducti- on	Source of Supply	Total Valuation of Assessed Estate April 1, 1930	Popu- lation 1930 Census	Pumping or Gravity	Services (1930)		Treatment
						Number	Per Cent Metered	
Oakham	1873	Coolidge Brook Reservoir	\$482,026	502	-	-	-	-
Orange	-	Crystal Spring	5,661,436	5,365	P.	1,029	93	-
Orleans	-	-	3,878,440	1,181	-	-	-	-
Otis	-	-	522,025	367	-	-	-	-
Oxford	-	-	3,102,490	3,943	-	-	-	-
Oxford Water Co.	1906	Tubular Wells	-	-	P.	689	71	-
Palmer	-	-	11,336,654	9,577	-	-	-	-
Palmer Fire District No. 1	1920	Graves Brook Reservoirs	-	-	G.	623	52	-
Boston Duck Co. (Bondsville)	1908	Tubular Wells (Emergency)	-	-	P.	-	-	-
Thorndike Village (Holden)	1919	Tubular Wells	-	-	G.	187	12	-
Thorndike (Healy)	-	Hamilton Reservoir	-	-	G.	-	-	-
Paxton	-	Bond's Spring	-	-	G.	-	-	-
PEABODY	1799	Spring Pond	885,717	672	-	-	-	-
Pelham	-	Suntaug Lake	23,648,800	21,345	P.	4,094	90	Chlorination
Pembroke	-	Tapley Brook Reservoir	-	-	P.	-	-	Chlorination
Pepperell	1913	Ipswich River (Emergency)	-	-	P.	-	-	Chlorination
Peru	-	Cedar Pond (Emergency)	-	-	P.	-	-	Chlorination
Petersham	-	Brockton Water Supply	688,678	455	-	-	-	-
Phillipston	1909	Tubular Wells	2,836,415	1,492	P.	649	91	-
PITTSFIELD	-	-	3,057,525	2,922	-	-	-	-
-	-	-	339,890	108	-	-	-	-
-	-	-	1,523,788	660	-	-	-	-
-	-	-	381,240	357	-	-	-	-
-	1855	Ashley Reservoir	59,165,770	49,677	G.	8,507	7	None
-	-	Ashley Lake	-	-	G.	-	-	None
-	-	Sackett Reservoir	-	-	G.	-	-	None
-	-	Hathaway Reservoir	-	-	G.	-	-	None
-	-	Mill Brook Reservoir	-	-	G.	-	-	None
-	-	Farnham Reservoir	-	-	G.	-	-	None
-	-	Onota Lake (Emergency)	-	-	P.	-	-	Dual Chlorination
Plainfield	-	North Attleborough Water Supply	369,237	306	-	-	-	-
Plainville	1909	Little South Pond	1,518,089	1,583	-	-	-	-
Plymouth	1855	Great South Pond	25,171,675	13,042	P.	3,015	66	-
-	-	Boot Pond	-	-	P.	-	-	-
-	-	Lout Pond	-	-	P.	-	-	-
Plympton	-	-	722,223	511	-	-	-	-
Prescott	-	-	77,287	48	-	-	-	-
Princeton	-	-	1,301,400	717	-	-	-	-
Provincetown	1893	Tubular Wells	4,081,327	3,808	P.	980	91	-
QUINCY	1884	Metropolitan Water Supply	141,758,725	71,983	-	16,839	97	-
Randolph	1888	Great Pond	5,797,950	6,553	P.	1,700	71	Chlorination
Raynham	-	-	1,823,258	2,136	-	-	-	-
Reading	1891	Filter Gallery near Ipswich River	15,830,425	9,767	P.	2,453	100	Iron Removal — Coagulation, Sedimentation, Rapid Sand Filtration, Chlorination
-	-	Tubular Wells	-	-	P.	-	-	-

Rehoboth	.	.	.	1884	Metropolitan Water Supply	2,166,475	2,610	-	6,315	100	-	-
REVERE	.	.	.			41,849,250	35,680	-	-		-	-
Richmond	.	.	.			676,982	583	-	-		-	-
Rochester	.	.	.	1887	See Abington	1,190,348	1,141	P.	-		-	-
Rockland	.	.	.	1885	Cape Pond	8,368,882	7,524	P.	-	2	Chlorination	-
Rockport	.	.	.		Tubular Wells	5,684,510	3,630	P.	-		-	-
Rowe	.	.	.			666,428	298	-	-		-	-
Rowley	.	.	.			1,399,083	1,356	-	-		-	-
Royalston	.	.	.			861,975	744	-	-		-	-
Russell	.	.	.	1911	Black Brook Reservoir	3,979,691	1,237	G.	-	0	-	-
Rutland	.	.	.	1896	Muschopauge Pond	1,363,280	2,442	P.	-	99	-	-
SALEM	.	.	.	1868	See Beverly	58,257,180	43,353	P.	-	65	-	-
Salisbury	.	.	.			3,086,183	2,194	-	-		-	-
Salisbury Water Supply Co.	.	.	.	1915	Dug Wells	-	-	P.	-	0	-	-
Sandisfield	.	.	.			674,175	412	-	-		-	-
Sandwich	.	.	.			2,589,005	1,437	-	-		-	-
Saugus	.	.	.	1878	Lynn Water Supply	14,181,420	14,700	-	-	94	-	-
Savoy	.	.	.			228,075	307	-	-		-	-
Scituate	.	.	.			13,322,442	3,118	-	-		-	-
Scituate Water Co.	.	.	.	1901	Tubular Wells	-	-	P.	-	6	Coagulation, Sedimentation, Rapid Sand Filtration	-
Seekonk	.	.	.		Old Oaken Bucket Pond	4,799,790	4,762	P.	-		-	-
Sharon	.	.	.	1885	Beaver Dam Spring	6,688,309	3,351	P.	-		-	-
Sheffield	.	.	.		Tubular Wells	-	-	P.	-	3	-	-
Sheffield Water Co.	.	.	.	1897	Dug Well (Emergency)	1,487,333	1,650	-	-		-	-
Shelburne	.	.	.		Smith and Clark Springs	2,706,738	1,544	G.	-	6	-	-
Shelburne Falls Fire District	.	.	.	1912	Reservoirs on Fox Brook	1,920,042	943	G.	-	99	-	-
Sherborn	.	.	.			2,031,019	2,427	-	-		-	-
Shirley	.	.	.			-	-	-	-		-	-
Shirley Village Water District	.	.	.	1903	Dug Wells	8,108,882	6,910	P.	-	96	-	-
Shrewsbury	.	.	.	1915	Tubular Wells	431,636	222	P.	-	98	-	-
Shutesbury	.	.	.			13,285,315	5,398	-	-		-	-
Somerset	.	.	.	1927	Tubular Wells	122,420,200	103,908	P.	-	100	-	-
SOMERVILLE	.	.	.	1867	Metropolitan Water Supply	885,251	931	-	-	100	-	-
Southampton	.	.	.			-	-	-	-		-	-
Southbridge	.	.	.	1900	Springs	3,172,800	2,166	G.	-	0	-	-
Southborough	.	.	.	1930	Sudbury Reservoir	11,997,760	14,264	P.	-		-	-
Southbridge Water Supply Co.	.	.	.	1880	2 Reservoirs on Hatchet Brook	9,984,781	6,773	G.	-	96	Aeration, Slow Sand Filtration	-
South Hadley	.	.	.	1872	Buttery Brook Reservoir	-	-	-	-		-	-
South Hadley Fire District No. 1	.	.	.		Leaping Well Reservoir	-	-	P.	-		-	-
South Hadley Fire District No. 2	.	.	.	1911	Dug Wells	-	-	P.	-		-	-
	.	.	.		Filter Gallery	-	-	P.	-		-	-
Southwick	.	.	.	1930	Springfield Water Supply	1,980,192	1,461	-	-		-	-
Spencer	.	.	.	1883	Shaw Pond	4,377,773	6,272	-	-		-	-
SPRINGFIELD	.	.	.	1874	Borden Brook Reservoir	309,470,550	149,900	G.	-	90	Sedimentation, Coagulation, Aeration, Modified Slow Sand Filtration	-
	.	.	.		Intake Reservoir (Little River)	-	-	G.	-		-	-
	.	.	.		Ludlow Reservoirs	-	-	G.	-		-	-
Sterling	.	.	.		Cobble Mountain Reservoir	1,842,295	1,502	G.	-		-	-



CITY OR TOWN	Date of In-troduction	Source of Supply	Total Valuation of Assessed Estate April 1, 1930	Population 1930 Census	Pumping or Gravity	Services (1930)		Treatment
						Number	Per Cent Metered	
Stockbridge			\$5,603,925	1,762	P.	—	—	—
Stockbridge Water Co.	1862	Lake Averic Reservoir on Bear Mountain Springs	—	—	G.	466	24	—
Hill Water Co.	1885	Metropolitan Water Supply	—	—	G.	14	0	—
Stoneham	1883	Muddy Pond	15,642,175	10,060	—	2,272	100	—
Stoughton	1886	Quinebaug River	8,656,118	8,204	P.	2,016	91	—
Stow	—	—	1,628,262	1,142	—	—	—	—
Sturbridge	—	—	1,300,850	1,772	P.	72	0	Slow Sand Filtration
Sturbridge Finishing Co. Fiskdale	1906	—	—	—	—	—	—	—
Sudbury	—	—	2,349,600	1,182	—	—	—	—
Sunderland	—	—	1,096,190	1,159	G.	125	0	—
Sunderland Water Co.	1883	Saw Mill Brook Reservoir	1,730,932	2,147	—	—	—	—
Sutton	—	—	—	—	P.	73	78	—
Sutton Water Co.	1915	Tubular Wells	23,252,655	10,346	—	2,673	100	—
Swampscott	1885	Metropolitan Water Supply	4,404,125	3,941	—	—	—	—
Swansea	—	Assawampsett Pond	38,764,660	37,355	P.	6,986	93	—
TAUNTON	1876	Elder's Pond	—	—	P.	—	—	—
Templeton	—	—	2,890,392	4,159	—	—	—	—
Tewksbury	—	—	3,503,157	5,585	—	—	—	—
Tisbury	1887	Spring	6,130,200	1,541	P.	657	2	—
Tolland	—	—	358,785	134	—	—	—	—
Topsfield	—	—	2,983,786	986	—	—	—	—
Townsend	—	—	1,869,115	1,752	—	—	—	—
Truro	—	—	1,560,652	513	—	—	—	—
Tyngsborough	—	—	1,184,660	1,358	—	—	—	—
Tyringham	—	—	409,615	246	—	—	—	—
Upton	—	—	1,331,655	2,026	P.	837	100	—
Uxbridge	1879	Tubular Wells	7,419,295	6,285	G.	—	—	—
Wakefield	1883	Crystal Lake	22,903,010	16,318	P.	3,494	100	Aeration, Slow Sand Filtration, Chlorination
Wales	—	—	—	—	P.	—	—	—
Walpole	—	Tubular Wells	387,074	360	—	—	—	—
Walpole	1896	Tubular Wells	15,331,354	7,273	P.	1,540	98	—
WALTHAM	1873	Dug Wells	59,328,000	39,247	P.	6,174	100	—
Ware	1886	Dug and Tubular Wells	7,091,475	7,385	P.	1,010	100	—
Wareham	—	—	12,216,525	5,686	—	—	—	—
Wareham Fire District	1908	Tubular Wells	—	—	P.	625	48	—
Warren	1894	Jonathan Pond	—	—	P.	1,458	0	—
Warren Fire District	—	—	3,251,432	3,765	P.	375	2	—
Warren Water District	1923	Tubular Wells	—	—	P.	138	0	—
Thorndike Company	1912	Dug Wells	—	—	—	—	—	—
Warwick	—	—	401,688	367	—	—	—	—
Washington	—	—	190,570	222	—	—	—	—
Watertown	1885	Metropolitan Water Supply	53,521,720	34,913	—	6,016	100	—
Wayland	1878	Tubular Wells	5,508,389	2,837	P.	850	3	—
Webster	1881	Dug and Tubular Wells	11,571,764	12,992	P.	1,579	97	—
Webster	—	Filter Gallery (Emergency)	—	—	P.	—	—	—



CITY OR TOWN	Date of Introduction	Source of Supply	Total Valuation of Assessed Estate April 1, 1930	Population 1930 Census	Pumping or Gravity	Services (1930)		Treatment
						Number	Per Cent Metered	
WORCESTER	1845	Kettle Brook Reservoir No. 1 Kettle Brook Reservoir No. 2 Kettle Brook Reservoir No. 3 Kettle Brook Reservoir No. 4 Lynde Brook Reservoir Upper Holden Reservoir Lower Holden Reservoir Kendall Reservoir Pine Hill Reservoir	\$347,202,250 — — — — — — — —	195,311 — — — — — — — —	G. G. G. G. G. G. G. G. G.	29,232 — — — — — — — —	96 — — — — — — — —	— — — — — — — — —
Worthington		Reservoir on Ward's Stream	589,965	485	—	31	0	—
Worthington Fire District	1911	Rice Springs	—	—	G.	—	—	—
Wrentham	1908	Tubular Wells	3,574,951	3,584	G.	573	89	—
Yarmouth	—	—	4,389,075	1,794	P.	—	—	—

Of the aforementioned cities and towns all of the cities and 197 of the towns are now provided with public water supplies.

The following table shows the number and population of cities and towns having and not having public water supplies at the end of the year 1930:

POPULATION 1930	Towns with Public Water Supplies		Towns without Public Water Supplies	
	Number of Towns	Population	Number of Towns	Population
Under 500	4	1,564	41	11,250
500-999	8	5,963	29	21,434
1,000-1,499	16	21,133	21	25,894
1,500-1,999	20	34,288	13	22,148
2,000-2,499	18	41,369	7	14,914
2,500-2,999	16	44,532	1	2,610
3,000-3,499	11	35,135	2	6,336
3,500-3,999	11	40,880	1	3,941
4,000-4,499	8	33,599	2	8,567
4,500-4,999	3	14,413	1	4,762
5,000 and over	121	3,849,297	1	5,585
Totals	236*	4,122,173*	119*	127,441*
Per cent	66.5	97.0	33.5	3.0

\*There are a total of 355 municipalities in Massachusetts with a population according to the 1930 census of 4,249,614.

### CONSUMPTION OF WATER

The consumption of water in 1930 in various cities and towns was in general somewhat less than the average, a condition probably due in part at least to a reduction in the amount of water used in industry and restrictions placed on the use of water because of the drouth. The following table shows the water consumption in the various cities and towns of which records are kept, copies of which are supplied to this Department, and the figures represent the amount of water consumed through all of the public water supplies in any one municipality:

#### *Average Daily Consumption of Water in Various Cities and Towns in 1930*

CITY OR TOWN	Popu- lation 1930	Gallons	Gallons per Inhabit- ant	CITY OR TOWN	Popu- lation 1930	Gallons	Gallons per Inhabit- ant
Metropolitan Water District	1,385,487	136,417,000	98	Bridgewater	9,055	213,000	24
Arlington	36,094	1,982,000	55	BROCKTON	63,797	3,294,000	52
Belmont	21,748	1,309,000	60	Brookfield	1,352	37,000	27
BOSTON	781,188	92,286,000	118	Brookline	47,490	4,698,000	99
CHELSEA	45,816	3,569,000	78	CAMBRIDGE	113,643	13,021,000	115
EVERETT	48,424	4,967,000	103	Canton	5,816	596,000	103
Lexington	9,467	630,000	67	Chelmsford	7,022	190,000	27
MALDEN	58,036	3,646,000	63	CHICOPEE	43,930	3,126,000	71
MEDFORD	59,714	3,357,000	56	Clinton	12,817	740,000	58
MELROSE	23,170	1,629,000	70	Cohasset	3,083	397,000	129
Milton	16,434	869,000	53	Concord	7,477	615,000	82
Nahant	1,654	197,000	119	Danvers and Middle- ton	14,669	1,241,000	85
QUINCY	71,983	5,499,000	76	Dartmouth	8,778	179,000	20
REVERE	35,680	2,225,000	62	Dedham	15,136	1,097,000	72
SOMERVILLE	103,908	9,376,000	90	Douglas	2,195	85,000	39
Stoneham	10,060	690,000	69	Dracut	6,912	192,000	28
Swampscott	10,346	811,000	78	Dudley	4,265	183,000	43
Watertown	34,913	2,168,000	62	Duxbury	1,696	203,000	120
Winthrop	16,852	1,207,000	72	East Bridgewater	3,591	162,000	45
Abington and Rock- land	13,396	653,000	49	East Brookfield	926	39,000	42
Acton	2,482	100,000	40	Easthampton	11,323	813,000	72
Acushnet	4,092	70,000	17	East Longmeadow	3,327	74,000	22
Agawam	7,095	317,000	45	Easton	5,298	245,000	46
Amesbury	11,899	735,000	62	Edgartown	1,276	152,000	119
Amherst	5,888	575,000	98	Fairhaven	10,951	499,000	46
Andover	9,969	817,000	82	FALL RIVER	115,274	6,179,000	54
Ashburnham	2,079	120,000	58	Falmouth	4,821	796,000	165
Athol	10,677	584,000	55	FITCHBURG	40,692	3,937,000	97
ATTLEBORO	21,769	1,159,000	53	Foxborough	5,347	504,000	94
Avon	2,414	144,000	60	Frammingham	22,210	1,469,000	66
Ayer	3,060	196,000	64	Franklin	7,028	478,000	68
Barnstable	7,271	451,000	62	GARDNER	19,399	906,000	47
Bedford	2,603	134,000	51	GLOUCESTER	24,204	1,578,000	65
Belchertown	3,139	22,000	7	Grafton	7,030	112,000	16
BEVERLY	25,086	1,500,000	60	Great Barrington	5,934	538,000	91
Billerica	5,880	355,000	60	Greenfield	15,500	1,404,000	91
Braintree	15,712	1,313,000	84	Groton	2,434	261,000	107
				Groveland	2,336	65,000	28



## Average Daily Consumption of Water in Various Cities and Towns in 1930 — Concluded

CITY OR TOWN	Population 1930	Gallons	Gallons per Inhabitant	CITY OR TOWN	Population 1930	Gallons	Gallons per Inhabitant
HAVERHILL . . . . .	48,710	4,102,000	84	Plainville . . . . .	1,583	117,000	74
Hingham . . . . .	6,657	1,381,000	207	Plymouth . . . . .	13,042	1,132,000	87
Holliston . . . . .	2,864	77,000	27	Provincetown . . . . .	3,808	327,000	86
HOLYOKE . . . . .	56,537	7,421,000	131	Randolph and Holbrook . . . . .	9,906	634,000	64
Hopkinton . . . . .	2,563	50,000	23	Reading . . . . .	9,767	403,000	41
Hudson . . . . .	8,469	382,000	45	Rockport . . . . .	3,630	363,000	100
Ipswich . . . . .	5,599	233,000	42	Rutland . . . . .	2,442	248,000	102
Lancaster . . . . .	2,897	122,000	42	SALEM . . . . .	43,353	5,000,000	115
LAWRENCE . . . . .	85,068	4,379,000	51	Salisbury . . . . .	2,194	197,000	90
Lenox . . . . .	2,742	300,000	109	Saugus . . . . .	14,700	825,000	56
Lincoln . . . . .	1,493	245,000	164	Scituate . . . . .	3,118	489,000	157
Littleton . . . . .	1,447	79,000	55	Sharon . . . . .	3,351	311,000	93
Longmeadow . . . . .	4,437	243,000	55	Shelburne . . . . .	1,544	75,000	49
LOWELL . . . . .	100,234	5,779,000	58	Shirley . . . . .	2,427	78,000	32
Ludlow . . . . .	8,876	247,000	28	Shrewsbury . . . . .	6,910	267,000	39
LYNN . . . . .	102,320	7,959,000	78	Somerset . . . . .	5,338	180,000	34
Lynnfield . . . . .	1,594	24,000	15	Southbridge . . . . .	14,264	619,000	43
Manchester . . . . .	2,636	344,000	131	Southwick . . . . .	1,461	11,000	8
Mansfield . . . . .	6,364	472,000	74	SPRINGFIELD . . . . .	149,900	15,467,000	103
Marblehead . . . . .	8,668	735,000	85	Stockbridge . . . . .	1,762	254,000	144
Marion . . . . .	1,638	218,000	133	Stoughton . . . . .	8,204	558,000	68
MARLBOROUGH . . . . .	15,587	683,000	44	TAUNTON . . . . .	37,355	2,852,000	76
Marshfield . . . . .	1,625	184,000	113	Tisbury . . . . .	1,541	280,000	182
Mattapoisett . . . . .	1,501	111,000	74	Uxbridge . . . . .	6,285	214,000	34
Maynard . . . . .	7,156	307,000	43	Wakefield . . . . .	16,318	665,000	41
Medfield . . . . .	4,066	77,000	19	Waldpole . . . . .	7,273	1,343,000	185
Medway . . . . .	3,153	178,000	56	WALTHAM . . . . .	39,247	2,253,000	57
Merrimac . . . . .	2,392	125,000	52	Ware . . . . .	7,385	368,000	50
Methuen . . . . .	21,069	986,000	47	Wareham . . . . .	5,686	299,000	53
Middleborough . . . . .	8,608	304,000	35	Warren . . . . .	3,765	64,000	17
Milford and Hopedale . . . . .	17,714	849,000	48	Wayland . . . . .	2,937	207,000	70
Milbury . . . . .	6,957	301,000	43	Webster . . . . .	12,992	662,000	51
Millis . . . . .	1,738	140,000	81	Wellesley . . . . .	11,439	938,000	82
Montague . . . . .	9,344	838,000	90	West Bridgewater . . . . .	3,206	157,000	49
Nantucket . . . . .	3,678	673,000	183	West Brookfield . . . . .	1,255	43,000	34
Natick . . . . .	13,589	746,000	55	WESTFIELD . . . . .	19,775	1,912,000	97
Needham . . . . .	10,845	651,000	60	Westford . . . . .	3,600	174,000	48
NEWBEDFORD . . . . .	112,597	9,675,000	86	Weston . . . . .	3,332	209,000	63
NEWBURYPORT . . . . .	15,084	1,304,000	86	West Springfield . . . . .	16,684	1,585,000	95
NEWTON . . . . .	65,276	4,998,000	77	Westwood . . . . .	2,097	30,000	14
North Andover . . . . .	6,961	455,000	65	Weymouth . . . . .	20,882	1,530,000	73
North Attleborough . . . . .	10,197	722,000	71	Whitman . . . . .	7,638	270,000	35
Northbridge . . . . .	9,713	627,000	65	Wilbraham . . . . .	2,719	71,000	26
North Brookfield . . . . .	3,013	371,000	123	Williamstown . . . . .	3,900	560,000	144
Norton . . . . .	2,737	132,000	48	Wilmington . . . . .	4,013	73,000	18
Norwood . . . . .	15,049	1,145,000	76	Winchendon . . . . .	6,202	239,000	39
Oak Bluffs . . . . .	1,333	191,000	143	Winchester . . . . .	12,719	908,000	71
Orange . . . . .	5,365	142,000	26	WOBBURN . . . . .	19,434	1,786,000	92
Oxford . . . . .	3,943	160,000	41	WORCESTER . . . . .	195,311	15,266,000	78
PEABODY . . . . .	21,345	2,903,000	136	Wrentham . . . . .	3,584	126,000	35
Pepperell . . . . .	2,922	270,000	92				
PITTSFIELD . . . . .	49,677	5,868,000	118				

## RAINFALL

The following table shows the normal rainfall in the State as deduced from records at eight widely distributed stations with long-term records, also the rainfall for the year 1930, and the excess or deficiency of precipitation in each month as compared with the normal.

MONTH	Normal Rainfall (Inches)	Rainfall in 1930 (Inches)	Excess or Deficiency in 1930 (Inches)	MONTH	Normal Rainfall (Inches)	Rainfall in 1930 (Inches)	Excess or Deficiency in 1930 (Inches)
January . . . . .	3.75	2.74	-1.01	August . . . . .	4.15	2.33	-1.82
February . . . . .	3.62	2.35	-1.27	September . . . . .	3.41	1.01	-2.40
March . . . . .	3.89	3.35	-0.54	October . . . . .	3.67	4.30	+0.63
April . . . . .	3.69	1.79	-1.90	November . . . . .	3.89	3.89	0.00
May . . . . .	3.56	3.13	-0.43	December . . . . .	3.68	2.42	-1.26
June . . . . .	3.29	2.52	-0.77				
July . . . . .	3.74	3.73	-0.01	Totals . . . . .	44.34	33.56	-10.78

## FLOW OF STREAMS

*Sudbury River*

The average yield of the Sudbury River in the year 1930 was 399,000 gallons per day per square mile of drainage area. This is about 22% lower than the average flow of the lowest previous year of which this Department has record. The normal flow of this river for the 56 years during which records have been maintained is 968,000 gallons per square mile per day. The average daily yield for the six driest months, May to October, inclusive, was 33,000 gallons per square mile, or only 8.6 per cent of the normal.

The following table shows the relation between the average daily yield of the Sudbury River per square mile in each month in the year 1930 and the normal yield of the river during the past 56 years. The drainage area of the river at the point of measurement is 75.2 square miles.

*Table showing the Average Daily Yield of the Sudbury River for Each Month in the Year 1930, in Cubic Feet per Second per Square Mile of Drainage Area, and in Million Gallons per Day per Square Mile of Drainage Area; also, Departure from the Normal.*

MONTH	NORMAL YIELD		ACTUAL YIELD IN 1930		EXCESS OR DEFICIENCY	
	Cubic Feet per Second per Square Mile	Million Gallons per Day per Square Mile	Cubic Feet per Second per Square Mile	Million Gallons per Day per Square Mile	Cubic Feet per Second per Square Mile	Million Gallons per Day per Square Mile
January . . . . .	1.730	1.118	.965	.624	— .765	— .494
February . . . . .	2.385	1.541	1.455	.940	— .930	— .601
March . . . . .	4.103	2.652	2.241	1.449	—1.862	—1.203
April . . . . .	3.037	1.963	1.533	.991	—1.504	— .972
May . . . . .	1.702	1.100	.626	.405	—1.076	— .695
June . . . . .	.779	.503	.069	.045	— .710	— .458
July . . . . .	.320	.207	— .036	— .023	— .356	— .230
August . . . . .	.346	.224	— .128	— .083	— .474	— .307
September . . . . .	.363	.235	— .280	— .181	— .643	— .416
October . . . . .	.587	.379	.045	.029	— .642	— .350
November . . . . .	1.183	.765	.771	.498	— .412	— .267
December . . . . .	1.496	.967	.218	.141	—1.278	— .826
Average for whole year . . . . .	1.498	.968	.617	.399	— .881	— .569

The rainfall on the Sudbury River watershed and the total yield expressed in inches in depth upon the watershed (inches of rainfall collected) for each of the past six years, 1925 to 1930, inclusive, together with the average for a period of fifty-six years, are given in the following table:

*Rainfall, in Inches, received and collected on the Sudbury River Drainage Area*

MONTH	1925			1926			1927		
	Rain-fall	Rain-fall collected	Per Cent collected	Rain-fall	Rain-fall collected	Per Cent collected	Rain-fall	Rain-fall collected	Per Cent collected
January . . . . .	4.47	.328	7.4	3.00	1.539	51.2	2.91	2.313	79.5
February . . . . .	2.20	2.985	136.0	5.92	1.596	27.0	3.71	2.355	63.5
March . . . . .	5.69	3.895	68.4	3.23	4.863	150.6	1.43	3.664	256.6
April . . . . .	2.95	2.570	87.2	2.21	3.323	150.5	2.24	1.194	53.3
May . . . . .	2.45	1.036	42.2	2.29	1.284	56.1	2.97	1.369	46.1
June . . . . .	4.75	.374	7.9	1.60	.179	11.2	1.99	.370	18.6
July . . . . .	5.35	.427	8.0	3.18	— .122	—3.8	3.82	.232	6.1
August . . . . .	1.25	.102	8.2	5.51	.415	7.5	8.92	1.688	18.9
September . . . . .	3.19	.068	2.1	1.40	— .196	—14.0	3.82	2.260	59.3
October . . . . .	4.41	.626	14.2	8.77	.203	5.4	5.10	2.313	45.3
November . . . . .	3.17	1.001	31.6	5.27	1.386	26.3	8.21	6.950	84.6
December . . . . .	5.76	3.330	57.8	4.03	1.195	29.7	5.61	4.931	87.8
Totals and averages . . . . .	45.64	16.742	36.7	41.41	15.665	37.8	50.73	29.639	58.4

*Rainfall, in Inches, received and collected on the Sudbury River Drainage Area—Cont.*

MONTH	1928			1929			1930			Mean for Fifty-six Years 1875-1930		
	Rain-fall	Rain-fall collected	Per Cent collected	Rain-fall	Rain-fall collected	Per Cent collected	Rain-fall	Rain-fall collected	Per Cent collected	Rain-fall	Rain-fall collected	Per Cent collected
January . . . . .	2.69	2.328	86.7	3.99	2.349	58.9	2.62	1.113	42.4	3.94	1.994	50.7
February . . . . .	3.62	2.746	75.9	3.84	2.434	63.3	2.52	1.515	60.1	4.02	2.504	62.3
March . . . . .	1.96	2.274	116.3	3.14	4.751	151.5	3.84	2.584	67.4	4.15	4.731	113.9
April . . . . .	5.44	3.035	55.7	7.30	5.070	69.4	2.06	1.709	83.0	3.65	3.388	92.7
May . . . . .	2.47	2.523	102.4	3.65	3.199	87.6	3.07	.722	23.5	3.25	1.962	60.4
June . . . . .	6.36	2.736	43.0	1.65	.394	23.9	1.62	.077	4.8	3.24	.869	26.8
July . . . . .	5.46	2.170	39.7	0.90	— .198	— 21.9	4.08	— .041	— 1.0	3.69	.369	10.0
August . . . . .	4.50	.981	21.8	2.14	— .105	— 4.9	2.49	— .147	— 5.9	3.81	.399	10.5
September . . . . .	3.84	1.026	26.7	2.11	— .043	— 2.1	0.81	— .313	— 38.5	3.31	.405	12.2
October . . . . .	3.52	.938	26.7	2.85	.097	3.4	4.37	.052	1.2	3.61	.677	18.8
November . . . . .	2.16	1.018	47.0	2.97	.439	14.8	4.36	.860	19.7	3.85	1.320	34.2
December . . . . .	2.68	1.500	56.0	4.08	.630	15.5	2.56	.251	9.8	3.78	1.725	45.6
Totals and averages . . . . .	44.70	23.275	52.1	38.62	19.017	49.2	34.40	8.383	24.4	44.30	20.343	45.9

The following table gives the record of the yield of the Sudbury River watershed in gallons per day per square mile for each of the past six years and the mean for the past fifty-six years:

*Yield of the Sudbury River Drainage Area in Gallons per Day per Square Mile<sup>1</sup>*

MONTH	1925	1926	1927	1928	1929	1930	Mean for Fifty-six Years, 1875-1930
January . . . . .	184,000	863,000	1,297,000	1,305,000	1,317,000	624,000	1,118,000
February . . . . .	1,852,000	991,000	1,462,000	1,645,000	1,511,000	940,000	1,541,000
March . . . . .	2,183,000	2,726,000	2,054,000	1,275,000	2,664,000	1,449,000	2,652,000
April . . . . .	1,491,000	1,927,000	692,000	1,760,000	2,941,000	991,000	1,963,000
May . . . . .	581,000	720,000	768,000	1,414,000	1,793,000	405,000	1,100,000
June . . . . .	217,000	104,000	215,000	1,585,000	228,000	45,000	503,000
July . . . . .	239,000	— 88,000	130,000	1,217,000	— 111,000	— 23,000	207,000
August . . . . .	57,000	233,000	946,000	550,000	— 59,000	— 83,000	224,000
September . . . . .	39,000	— 113,000	1,307,000	594,000	— 25,000	— 181,000	235,000
October . . . . .	351,000	114,000	1,297,000	526,000	54,000	29,000	379,000
November . . . . .	580,000	803,000	4,026,000	589,000	254,000	498,000	765,000
December . . . . .	1,867,000	670,000	2,764,000	841,000	353,000	141,000	967,000
Average for whole year . . . . .	797,000	746,000	1,411,000	1,105,000	905,000	399,000	968,000
Average for driest six months . . . . .	247,000	167,000	676,000	721,000	55,000	33,000	384,000

<sup>1</sup> The drainage area of the Sudbury River used in making up these records included water surfaces amounting to about 2 per cent of the whole area from 1875 to 1878, inclusive, subsequently increasing by the construction of storage reservoirs to about 3 per cent in 1879, to 3.5 per cent in 1885, to 4 per cent in 1894, and to 6.5 per cent in 1898. The drainage area also contains extensive areas of swampy land, which, though covered with water at times, are not included in the above percentages of water surfaces.

*Nashua River*

The average yield of the South Branch of the Nashua River at the outlet of the Wachusett Reservoir in Clinton during the year 1930 was 566,000 gallons per day per square mile of drainage area, or about 52.6 per cent of the average for the past 34 years.

The average yield for the six driest months, July to December, inclusive, was 353,000 gallons per day per square mile, or 64 per cent of the normal.

The greatest deficiency in flow occurred in the month of March when the deficiency was 52.6% below the normal. As a result of the abnormally low yield prevailing on this drainage area during the year 1930 the storage in Wachusett Reservoir was considerably depleted and the water level reduced to 40 feet below the elevation of the spillway at the dam. This amounts to a total reduction of storage of 41 billion gallons, or 63% of the total storage capacity of the reservoir.

The following table shows the normal yield of the river by months for the past 34 years, the actual yield in the year 1930, and the excess or deficiency in each month. The drainage area of the Nashua River above the point of measurement



was 119 square miles from 1897 to 1907 and 118.19 square miles from 1908 to 1913, inclusive. Since January 1, 1914, the city of Worcester has been diverting water from 9.35 square miles of this drainage area for the supply of that city, leaving the net drainage area 108.84 square miles.

*Table showing the Average Daily Yield of the South Branch of the Nashua River for Each Month in the Year 1930, in Cubic Feet per Second per Square Mile of Drainage Area, and in Million Gallons per Day per Square Mile of Drainage Area; also, Departure from the Normal.*

MONTH	NORMAL YIELD		ACTUAL YIELD in 1930		EXCESS OR DEFICIENCY	
	Cubic Feet per Second per Square Mile	Million Gallons per Day per Square Mile	Cubic Feet per Second per Square Mile	Million Gallons per Day per Square Mile	Cubic Feet per Second per Square Mile	Million Gallons per Day per Square Mile
January . . . . .	1.791	1.158	1.002	.648	— .789	— .510
February . . . . .	2.009	1.298	1.341	.867	— .668	— .431
March . . . . .	3.926	2.537	1.861	1.203	—2.065	—1.334
April . . . . .	3.370	2.178	1.477	.955	—1.893	—1.223
May . . . . .	2.019	1.305	.902	.583	—1.117	— .722
June . . . . .	1.256	.812	.693	.448	— .563	— .364
July . . . . .	.735	.475	.701	.453	— .034	— .022
August . . . . .	.646	.418	.346	.224	— .300	— .194
September . . . . .	.578	.374	.364	.235	— .214	— .139
October . . . . .	.707	.457	.568	.367	— .139	— .090
November . . . . .	1.220	.788	.726	.469	— .494	— .319
December . . . . .	1.747	1.129	.574	.371	—1.173	— .758
Average for whole year . .	1.665	1.076	.876	.566	— .789	— .510

The rainfall on the Nashua River watershed and the total yield expressed in inches in depth upon the watershed (inches of rainfall collected) for each of the past six years, 1925 to 1930, inclusive, together with the average for the past 34 years, are given in the following table:

*Rainfall, in Inches, received and collected on the Nashua River Drainage Area*

MONTH	1925			1926			1927		
	Rain-fall	Rain-fall collected	Per Cent collected	Rain-fall	Rain-fall collected	Per Cent collected	Rain-fall	Rain-fall collected	Per Cent collected
January . . . . .	3.68	.563	15.3	2.64	1.695	64.1	3.34	2.184	65.5
February . . . . .	2.27	2.524	111.3	5.77	1.340	23.2	4.63	1.784	38.6
March . . . . .	5.81	4.005	69.0	2.92	3.366	115.1	1.71	4.167	244.4
April . . . . .	3.06	2.482	81.1	2.46	4.165	169.4	2.10	1.669	79.7
May . . . . .	2.14	1.262	58.8	2.00	1.471	73.6	3.04	1.623	53.3
June . . . . .	3.97	.684	17.2	2.05	.699	34.2	2.17	.742	34.2
July . . . . .	3.95	.417	10.6	2.93	.461	15.7	5.94	.997	16.8
August . . . . .	2.04	.347	17.0	2.90	.449	15.5	9.48	2.875	30.3
September . . . . .	4.26	.596	14.0	1.43	.347	24.2	3.51	2.086	59.4
October . . . . .	4.37	.779	17.8	4.69	.691	14.7	5.02	1.972	39.2
November . . . . .	3.43	1.378	40.2	5.32	1.512	28.4	7.50	4.521	60.3
December . . . . .	4.39	2.897	65.9	4.20	1.162	27.7	6.23	4.552	73.0
Totals and averages . .	43.37	17.934	41.3	39.31	17.358	44.2	54.67	29.172	53.4



*Rainfall, in Inches, received and collected on the Nashua River Drainage Area—Cont.*

MONTH	1928			1929			1930			Mean for Thirty-four Years 1897-1930		
	Rain-fall	Rain-fall collected	Per Cent collected	Rain-fall	Rain-fall collected	Per Cent collected	Rain-fall	Rain-fall collected	Per Cent collected	Rain-fall	Rain-fall collected	Per Cent collected
January	3.03	2.657	87.7	4.80	2.140	44.5	2.11	1.156	54.8	3.62	2.065	57.1
February	3.92	3.014	77.0	4.28	2.310	54.0	2.20	1.396	63.5	3.82	2.107	55.2
March	2.08	2.291	110.3	3.40	4.912	144.5	3.65	2.146	58.7	3.90	4.526	116.1
April	5.30	3.679	69.4	5.83	4.953	84.9	1.88	1.646	87.8	3.87	3.760	97.1
May	2.92	2.946	100.8	4.62	3.851	83.3	2.77	1.039	37.5	3.31	2.328	70.4
June	6.64	3.575	53.8	3.09	1.020	33.0	2.96	.773	26.1	3.80	1.401	36.8
July	4.75	1.627	34.2	.85	.265	31.2	5.72	.808	14.1	4.11	.847	20.6
August	5.07	1.179	23.2	1.50	.125	8.4	1.69	.399	23.5	3.97	.745	18.8
September	3.83	1.117	29.1	2.00	.272	13.6	1.91	.406	21.3	3.53	.645	18.3
October	1.99	.710	35.7	3.12	.427	13.7	3.55	.655	18.4	3.23	.815	25.2
November	2.40	.776	32.4	3.14	.630	20.1	3.92	.810	20.7	3.74	1.361	36.4
December	2.08	1.199	57.6	3.30	.739	22.4	2.61	.661	25.4	3.95	2.014	51.0
Totals and averages	44.01	24.770	56.3	39.93	21.644	54.2	34.97	11.895	34.0	44.85	22.614	50.4

The following table gives the record of the yield of the Nashua River watershed in gallons per day per square mile for each of the past six years and the mean for the past 34 years:

*Yield of the Nashua River Drainage Area in Gallons per Day per Square Mile<sup>1</sup>*

MONTH	1925	1926	1927	1928	1929	1930	Mean for Thirty-four Years, 1897-1930
January	316,000	951,000	1,224,000	1,490,000	1,200,000	648,000	1,158,000
February	1,566,000	831,000	1,108,000	1,806,000	1,434,000	867,000	1,298,000
March	2,245,000	1,887,000	2,336,000	1,284,000	2,754,000	1,203,000	2,537,000
April	1,440,000	2,416,000	968,000	2,134,000	2,873,000	955,000	2,178,000
May	708,000	825,000	910,000	1,651,000	2,159,000	583,000	1,305,000
June	396,000	405,000	430,000	2,071,000	591,000	448,000	812,000
July	234,000	258,000	559,000	912,000	148,000	453,000	475,000
August	194,000	252,000	1,612,000	661,000	70,000	224,000	418,000
September	345,000	201,000	1,207,000	646,000	157,000	235,000	374,000
October	437,000	387,000	1,105,000	398,000	239,000	367,000	457,000
November	799,000	876,000	2,619,000	450,000	365,000	469,000	788,000
December	1,624,000	651,000	2,552,000	672,000	414,000	371,000	1,129,000
Average for whole year	854,000	826,000	1,389,000	1,176,000	1,031,000	566,000	1,076,000
Average for driest six months	386,000	389,000	949,000	624,000	232,000	353,000	552,000

<sup>1</sup> The drainage area used in making up these records included water surfaces amounting to 2.2 per cent of the whole area from 1897 to 1902, inclusive, to 2.4 per cent in 1903, to 3.6 per cent in 1904, to 4.1 per cent in 1905, to 5.1 per cent in 1906, to 6 per cent in 1907, to 7 per cent in 1908, 1909 and 1910, to 6.5 per cent in 1911, to 6.8 per cent in 1912, to 7 per cent in 1913, to 7.4 per cent in 1914 and 1915, to 7.6 per cent in 1916, to 7.4 per cent in 1917 and 1918, to 7.5 per cent in 1919, 1920, 1921 and 1922, to 7.4 per cent in 1923 and 1924, to 6.4 per cent in 1925, to 5.9 per cent in 1926, to 5.7 per cent in 1927, to 7.6 per cent in 1928, to 7.4 per cent in 1929, and 5.6 per cent in 1930.

*Merrimack River*

The Merrimack River is the second in size of the streams of Massachusetts. The river rises in the White Mountains of New Hampshire and flows southerly through the central part of that State until it enters Massachusetts, where it turns to the east and flows in a general northeasterly direction the remainder of its course to the sea. The total length of its watershed from its extreme northerly limits in the mountains of northern New Hampshire to its extreme southerly limits in the hills of Hopkinton, Massachusetts, is about 137 miles and its extreme width about 66 miles. Its total drainage area above its mouth at Newburyport is about 5,000 square miles, of which about one-quarter is within the limits of Massachusetts and the remainder within the State of New Hampshire.

Records of the flow of the Merrimack River have been kept continuously at Lawrence since 1880. The drainage area of the river at that point is 4,663 square miles, including 118.19 square miles tributary to the South Branch of the Nashua River used for the water supply of the Metropolitan District and in part for the

city of Worcester, 75.2 square miles on the Sudbury River, and 18 square miles tributary to Lake Cochituate. The flow as measured at Lawrence includes the water wasted from these drainage areas. In presenting the record of the flow of the river these drainage areas have been deducted, leaving the net drainage area above Lawrence 4,567 square miles in 1880, 4,570 square miles in the years 1891 to 1897, inclusive, and 4,452 square miles since the latter year. The quantity of water overflowing from the Cochituate and Sudbury watersheds as measured by the Metropolitan District Commission has also been deducted from the flow of the river as measured at Lawrence. The average flow of the river during the year 1930 amounted to 0.927 cubic feet per second per square mile, or 599,100 gallons per day per square mile of drainage area, which is about 63% of the normal for the past 51 years. The flow was less than the normal in each month during the year. The greatest deficiency occurred in April.

The following table shows the relation between the normal flow of this stream during the past 51 years and the actual flow during each month of the year 1930.

*Table showing the Average Monthly Flow of the Merrimack River at Lawrence for the Year 1930, in Cubic Feet per Second per Square Mile of Drainage Area; also, Departure from the Normal*

MONTH	Normal Flow, 1880-1930	Actual Flow in 1930	Excess or Deficiency
January	1.260	.861	— .399
February	1.346	.949	— .397
March	2.747	2.242	— .505
April	3.484	2.035	—1.449
May	2.245	1.172	—1.073
June	1.251	1.055	— .196
July	.766	.521	— .245
August	.654	.520	— .134
September	.646	.378	— .268
October	.783	.311	— .472
November	1.125	.562	— .563
December	1.271	.518	— .753
Average for whole year	1.465	.927	— .538

The following table gives the record of the flow of the Merrimack River at Lawrence for each of the past six years, together with the average flow for the past 51 years, this amount being expressed in cubic feet per second per square mile of drainage area:

*Flow of the Merrimack River at Lawrence in Cubic Feet per Second per Square Mile*

MONTH	1925	1926	1927	1928	1929	1930	Mean for Fifty-one Years, 1880-1930
January	.357	1.027	.955	2.039	1.537	.861	1.260
February	1.882	.796	1.047	2.069	1.487	.949	1.346
March	3.413	1.648	3.161	2.048	3.649	2.242	2.747
April	3.102	3.933	1.828	3.437	3.993	2.035	3.484
May	1.349	2.165	1.417	3.160	3.424	1.172	2.245
June	.689	.843	.785	2.300	.973	1.055	1.251
July	.712	.527	.645	1.636	.583	.521	.766
August	.518	.405	.708	1.550	.400	.520	.654
September	.454	.341	.949	1.500	.365	.378	.646
October	.735	.509	1.355	.977	.408	.311	.783
November	1.067	1.395	3.733	.979	.499	.562	1.125
December	1.577	.872	3.015	1.115	.488	.518	1.271
Average for whole year	1.321	1.205	1.633	1.901	1.484	.927	1.465
Average for driest six months	.696	.670	.977	1.293	.457	.468	.871

### *Sudbury, Nashua and Merrimack Rivers*

The following table shows the weekly fluctuations during the year 1930 in the yield of the Sudbury River at Framingham, the South Branch of the Nashua River at the outlet of the Wachusett Reservoir in Clinton, and the Merrimack River at Lawrence. The flow of these streams, particularly that of the Sudbury River and the South Branch of the Nashua River, serves to indicate the flow of other streams in eastern Massachusetts. The area of the Sudbury River watershed is 75.2 square miles, of the South Branch of the Nashua River 118.19 square miles, and of the Merrimack River at Lawrence 4,452 square miles.

*Table Showing the Average Weekly Flow of the Sudbury, South Branch of the Nashua and the Merrimack Rivers for the Year 1930, in Cubic Feet per Second per Square Mile of Drainage Area.*

WEEK ENDING SUNDAY —	Yield of Sudbury River	Yield of South Branch, Nashua River	Flow of Merrimack River	WEEK ENDING SUNDAY —	Yield of Sudbury River	Yield of South Branch, Nashua River	Flow of Merrimack River
Jan. 5 . . .	.927	.858	.552	July 6 . . .	.730	.721	.566
12 . . .	.951	1.446	1.092	13 . . .	.208	.846	.552
19 . . .	2.259	1.294	1.092	20 . . .	.869	.496	.508
26 . . .	1.421	.661	.750	27 . . .	.930	.872	.473
Feb. 2 . . .	1.461	.541	.606	Aug. 3 . . .	1.106	.321	.449
9 . . .	.510	.688	.555	10 . . .	.116	.336	.437
16 . . .	1.526	1.208	.601	17 . . .	.052	.397	.478
23 . . .	1.920	2.003	.950	24 . . .	.572	.372	.753
Mar. 2 . . .	2.158	1.730	2.090	31 . . .	.496	.352	.491
9 . . .	2.432	2.251	1.364	Sept. 7 . . .	.195	.443	.433
16 . . .	3.224	1.674	2.972	14 . . .	.498	.316	.409
23 . . .	2.918	1.313	1.711	21 . . .	.433	.419	.367
30 . . .	2.421	2.422	3.041	28 . . .	.640	.319	.320
Apr. 6 . . .	1.416	1.596	1.842	Oct. 5 . . .	.516	.250	.233
13 . . .	2.613	2.360	3.146	12 . . .	.174	.363	.271
20 . . .	1.600	1.181	2.061	19 . . .	.476	.749	.263
27 . . .	.994	.979	1.531	26 . . .	.133	.657	.297
May 4 . . .	.663	1.076	1.209	Nov. 2 . . .	.199	.672	.481
11 . . .	1.469	.788	1.388	9 . . .	.382	.426	.475
18 . . .	.888	.882	.991	16 . . .	.380	.697	.400
25 . . .	1.253	.743	1.076	23 . . .	1.453	1.197	.883
June 1 . . .	1.028	.965	1.170	30 . . .	.646	.678	.573
8 . . .	1.861	.885	.808	Dec. 7 . . .	.417	.408	.578
15 . . .	1.342	1.230	1.387	14 . . .	.113	.658	.577
22 . . .	1.702	.700	1.172	21 . . .	.065	.462	.456
29 . . .	1.226	.370	.898	28 . . .	.494	.757	.449

### EXAMINATION OF RIVERS

The deficiency in rainfall from June 1, 1929, to October 1, 1930, reduced very decidedly the quantity of water available for the dilution of the sewage and industrial wastes in many of the streams, but depression in some of the industries has reduced the quantity of sewage and industrial wastes discharged into the streams and there has been an improvement in the condition of many rivers and streams as compared with other years.

During the past year the principal rivers of the State have been examined, and samples of water have been collected for analysis from the more important streams at approximately the same points as in previous years. The examinations have generally been confined to the drier part of the year, from June to November, inclusive.

#### *Aberjona River*

In the year 1927 the city of Woburn constructed a sewer for the removal of the sewage and wastes which were being discharged into the Aberjona River. On account of excessive leakage into this sewer it was never put into use, and in the year 1929, as a result of an action begun by the Attorney General against certain establishments which polluted the stream in Woburn, that city began to rebuild the sewer. This sewer has now been entirely rebuilt and the leakage reduced to a reasonable minimum. A connection can be made to the Metropolitan sewerage system at any time. A contract was being drawn up near the end of the year for the extension of this sewer to certain tanneries.

The results of the analyses of samples of water from the river at various points continue to show serious pollution in some portions of its course, but in general they show somewhat less evidence of pollution than in previous years. This condition probably has been brought about by the depression at some of the manufacturing plants and by changes in methods of manufacturing. Analyses of samples of water from Upper Mystic Lake also show an improvement as compared with those of the previous year.



*Assabet River*

At the Grafton State Hospital pumps for the removal of sewage from the watershed of the Assabet River have been installed, and the sewage is now pumped to sewage disposal works located outside the watershed of this river. A slight improvement in the condition of the river has taken place above the Westborough sewage disposal works.

During the year, work on improving the Westborough sewage disposal works was completed, and one new bed was constructed. A slight improvement has been shown in the condition of the river below these works.

Below Northborough improvement was noted in the condition of the river during the past year, and similar improvement was noted below Hudson. At Maynard the sewerage system and sewage disposal works, construction of which was commenced in 1929, were put in operation during the early part of the summer, and the river below Maynard has shown some improvement in its condition.

Early in the year, in accordance with recommendations of the Department, the Massachusetts Reformatory at Concord began the construction of additional filter beds for the disposal of sewage and for the removal of manufacturing waste from the river. At the end of the year these works had been completed, but, with the exception of the use of the settling tank in connection with the disposal of the domestic sewage, the works probably will not be placed in general use until spring.

*Blackstone River*

A complaint relative to the condition of Kettle Brook, one of the principal tributaries of the Blackstone River in the upper part of its course, was made during the year. Examinations were made of several manufacturing plants located along the brook, and the Department advised as to methods of treating the sewage and wastes. Examinations of the Blackstone River below Worcester, both above and below the sewage disposal works of the city, have shown a slight improvement in the condition of the river as compared with recent years.

Below Millbury the condition of the river has somewhat improved, but at Northbridge and Uxbridge the results of the analyses of samples collected show but little change in the condition of the river during the past year. At Millville there was also but little change.

The improved condition of the river immediately below Worcester probably can be accounted for by the fact that less storm water and untreated sewage has been discharged into the river from the Worcester sewerage system than in normal years. Examinations of the river below Worcester and Millbury continue to show the presence of considerable quantities of tar and oil.

*Charles River*

The condition of this stream below Milford still continues to be objectionable and has changed but little during the past year. Mine Brook, one of the upper tributaries below the Franklin sewage filters, remains practically in the same condition as in the previous year. The condition of the river below Medway has changed but little over that of the previous year and continues to be objectionable. Below Medfield and throughout the rest of its course to the Charles River Basin, the river, as shown by the results of the analyses, was more satisfactory than during the previous year. During the summer the Department investigated complaints of the condition of this stream which was caused by the drawing down of the water in the mill pond of the Boston Manufacturing Company above Moody Street, Waltham.

*Concord and Sudbury Rivers*

During the year, most of the flow of the Sudbury River above the lowest dam of the Metropolitan water works just above Framingham in excess of 1,500,000 gallons per day was diverted for the use of the Metropolitan Water District.

Bannister Brook, one of the tributaries of the Sudbury River which enters the river near Saxonville, receives the effluent from the sewage filter beds of the towns of Natick and Framingham, and at times partially treated sewage finds its way into this stream. The results of the analyses of samples of the water collected during the year show a deterioration in the quality of the water of this brook.



Below Saxonville the condition of the river has changed but little during the past year.

The Concord River below the junction of its principal tributaries, the Sudbury and Assabet rivers, has shown no material change during the year throughout most of its course, but at its mouth at Lowell a slight improvement in the condition of the stream was noticed.

#### *Connecticut River*

The condition of the Connecticut River, as shown by the analyses of its waters above Holyoke, is slightly improved over the condition in recent years, but the Mill River below Northampton, a minor tributary, has shown an increase in pollution during the past year. This stream and the Manhan River, another tributary, are badly polluted by domestic sewage, the evidence of which was more marked during the past year.

#### *French River*

The French River is very badly polluted at Webster and Dudley by sewage and industrial wastes discharged directly into the stream. The condition of the river was more objectionable in 1930 than for a number of years, particularly below Webster. No action has been taken by the towns of Webster and Dudley in the matter of preventing pollution of this river.

#### *Hoosick River*

In the annual report of the Department for the year 1929 it was stated that the condition of the Hoosick River below North Adams is gradually growing worse. The condition during the past year has been even more objectionable than during the year 1929. There has been but little change in the condition of the river below Williamstown, and the stream throughout much of its course in Massachusetts was offensive during the drier part of the year.

#### *Housatonic River*

In recent years the results of analyses of samples of the Housatonic River have shown an increase in the pollution of the river, but during the year 1930 the condition of the river has generally shown some improvement, especially below all branches in Pittsfield and below Stockbridge and Great Barrington. During the past year there has been less overflow of sewage from the Pittsfield sewage pumping station than in recent years due no doubt to the low rainfall. Plans for the extension of the sewage disposal works of Pittsfield were submitted and the Department advised relative thereto in 1930.

#### *Merrimack River*

Under the provisions of Chapter 202 of the Acts of the year 1929, the Department of Public Health was authorized and directed "to investigate annually until otherwise ordered by the general court, the condition of the Merrimack river and the pollution thereof within the limits of the commonwealth and to determine whether the condition of the stream has changed materially since the last previous investigation thereof at any point within the aforesaid limits." The Department was also directed to report to the General Court the results of its investigations in its annual report.

In accordance with the provisions of the above act, an examination of the river and its tributaries has been made during the year, the results of which indicate in general an increase in pollution in that portion of its course from Lowell to the sea. This was no doubt due in part at least to the abnormally low flow.

#### *Nashua River*

The Nashua River above the effluent outlet of the Fitchburg sewage disposal plant has continued to be objectionable during the past year due to the discharge of foul industrial wastes into the stream.

Farther down stream above North Leominster its condition shows increasing evidence of gross pollution.

At Leominster most of the sewage of the city is discharged into Monoosnock Brook near its mouth, and that stream is practically an open sewer. The results

of the analyses of samples from the North Branch of the river below Leominster and at its mouth at Lancaster show that the river contained more putrescible organic matter during 1930 than in any year since the compiling of the records of the analyses was started many years ago.

The South Branch of the Nashua River above the point of entrance of the effluent from the Clinton sewage disposal works has in years past been badly polluted, and during 1930 there has been but little change in its condition. Below the entrance of the effluent from the Clinton sewage disposal works the stream continues to show evidence of much pollution.

Below the confluence of the North and South branches the condition of the stream was worse during the past year than in any year since the records of the analyses have been compiled.

During the past year complaints have been made to this Department relative to the condition of the Nashua River at Lancaster, and legislation for improvement of the river is now under consideration.

#### *Neponset River*

As a result of an investigation by this Department in 1926, in response to an order of the Legislature, the results of which were presented to the Legislature in House Document 212 of the year 1927, an act was passed in 1928 (Chapter 384) admitting the towns of Canton, Stoughton, Norwood and Walpole into the Metropolitan Sewerage District and providing for the construction of a sewer for the removal of sewage and manufacturing waste from these municipalities into the South Metropolitan sewerage system. The main sewer is being rapidly constructed in this valley to receive the sewage of the towns and the industrial wastes which are now discharged into the river or its tributaries. During the year 1930 the river continued to be very badly polluted throughout most of its course and during the past two years has been more objectionable at Milton Lower Mills than in other recent years.

#### *North River in Salem and Peabody*

The condition of the North River has been very objectionable and was a source of serious complaint by the authorities of the city of Salem. During the year legislation was introduced with a view of giving this Department certain mandatory powers to prevent pollution of this stream, but such legislation was not enacted.

#### *Taunton River*

The Taunton River and its tributaries show somewhat more marked evidence of pollution in the upper waters than in recent years, and the results of the available analyses show evidence of an increase in the pollution of the main stream at Berkeley bridge below Taunton.

The examinations of the other streams have shown no important changes during the past year.

#### EXAMINATION OF SEWAGE DISPOSAL WORKS

At Attleboro the sewage has been as well distributed over the entire area of filter beds as usual and the results of the operation of these works have been reasonably satisfactory during the year. The accumulation of sludge upon the filter beds continues to increase although the analyses do not show any material increase in the strength of the sewage. If the increase in sludge continues, however, it will probably be necessary to provide a settling tank for the preliminary treatment of the sewage.

At Brockton the greater part of the sewage has been applied first to the trickling filter and subsequently passed through secondary sand filters. The area of secondary sand filters which was increased last year has been in regular use and the results of the treatment of the sewage have been satisfactory. These secondary sand filter beds are operated at a much higher rate than is customary for ordinary sand filters but the percent of removal of organic matter as shown by the free and albuminoid ammonia is as high as that of other sand filtration plants where the rate of operation is much lower.

At Clinton the quantity of sewage pumped to the disposal works has been less than recent years. The filter beds which are not capable of treating all of the

sewage continue to give less satisfactory results and although the quantity of sewage treated on the beds during the past year has been less than in any recent year it was necessary, due to the clogged condition of the beds, to overflow large quantities of sewage into the south branch of the Nashua River both at the pumping station without treatment and after sedimentation at the filter beds. Great quantities of the day flow of sewage are at times discharged into the Nashua River after sedimentation, while the entire night flow is frequently discharged directly to the river from the pumping station. Extensive improvements are necessary at these works and should be made without further delay.

At Concord the results of the operation of the filter beds have been very satisfactory. The addition of the sewerage system at West Concord which was completed last year added several miles of sewers to the system. There has been a considerable increase in the number of house connections throughout the town.

At Easthampton the sewage of the town is passed through settling tanks but during the past year less than half of this quantity was filtered through the sand filter beds, the larger portion being discharged directly into the Manhan River after passing through the settling tanks. While the filter beds are not adequate for the proper disposal of the entire quantity of sewage of the town, better distribution and proper operation of the beds would result in a smaller amount of sewage being discharged into the Manhan River. The large amount of sewage discharged into this river is the cause of the increase in pollution of the river during the year.

At Fitchburg the usual care in the operation of the sewage disposal works has been maintained throughout the year and the results obtained have been satisfactory.

Throughout the year the Framingham sewage disposal works as a whole have been operated satisfactorily but near the end of the year foaming was noticeable in one of the Imhoff tanks. It is important that some means be installed at these works for measuring and recording the quantity of sewage treated.

The disposal works at Franklin continue to give unsatisfactory results, a condition largely due to an improper distribution of the sewage over the area. The quantity of sewage discharged to the works this year has been less than in previous years.

The condition of the sewage disposal works at Gardner has remained about the same as in recent years. During the year plans for an additional area for filter beds at the Templeton area were submitted to this Department and approved and at the end of the year an additional area of about 4 acres was practically ready for use. This increase in area of the filter beds should result in an improvement in the treatment of sewage at this plant. Suitable means for measuring and recording the quantity of sewage discharged through these disposal works should be provided.

The sewage filters at Hopedale continue to give satisfactory results. The sewage discharged to these filter beds is well distributed and the entire plant appears to be adequately cared for.

The sewage filters at Leicester, which were rebuilt and enlarged a year ago, have not given satisfactory results. Further additions should be made at this plant and the filter beds should be given more effective care.

During the past year the area of sewage filters at Marion was increased by 0.78 of an acre and a settling tank and dosing tank were also constructed. These new works were put into operation during the early summer and the efficiency of the plant has been materially improved.

The sewage filters at Marlborough have continued to give satisfactory results. The sewage discharged to these filter beds is well distributed and the plant is well cared for but the disposal of the sludge continues to be a disturbing factor.

In 1929 the town of Maynard submitted to the Department for its approval plans for a sewage disposal works consisting of an Imhoff tank, dosing tank, trickling filter, secondary tank and pump house. The plans were approved by this Department and the plant was completed and put into use in June of this year. Thus far these works appear to have disposed of the sewage in a satisfactory manner.

The disposal works at Milford have been operated in a better manner than in recent years, and the character of the effluent of the sand filters has shown more improvement than for several years. Although the operation of the Imhoff tank



and trickling filter shows more efficient results the plant probably could be more effectively operated if measuring or recording devices were installed so that the quantity of sewage treated might be known.

At Nantucket the new disposal works comprising four acres of sand filters were put into operation during the year but due to high winds and tides the banks of some of the beds were blown or washed away and it has been necessary to reconstruct these beds. At the end of the year it was necessary to discharge all of the sewage onto one bed.

At Natick the disposal of sewage continues to be unsatisfactory, the works being inadequate for the proper treatment of all the sewage of the town. The amount of sewage during the past year has been less than in recent years and the results of the analyses show that it is much stronger than is normal for this town. Better distribution of the sewage daily over the entire area of filter beds and an additional area of filters are needed.

At North Attleboro four new beds for filtering the sewage of this town were constructed during the past year and at the end of the year were practically ready for operation. The treatment of sewage at these works continued to be unsatisfactory during the year and due to the construction of the new beds some of the old beds could not be used. The amount of sewage reaching the disposal works during the past year was less than usual due to a reduction in the amount of leakage into the sewers. The reconstruction of the old filters should be started without further delay.

The filter beds at Northbridge appeared to be operated with satisfactory results during the past year. The sewage received at this plant is well distributed and considerable improvement in its efficiency has been shown during the past two years.

At Norwood the filter beds available during the past year were inadequate for the proper treatment of the sewage of the town and considerable quantities of sewage overflowed to areas outside the filter beds and at times directly into the Neponset River. The extension of the South Metropolitan sewer in the Neponset River Valley when completed should remedy the present unsatisfactory condition of the river below this town and make further operation of the sewage filters unnecessary.

The disposal works at Pittsfield continue to be inadequate for the disposal of sewage of that city and much sewage is discharged into the Housatonic River below the plant. Plans for improving these works, submitted to this Department, were approved during the year and the construction work on the enlargement of this plant should be begun at an early date.

At Southbridge the present capacity of the sewage disposal works continues to be inadequate for the proper treatment of all the sewage of the town and large quantities of the sewage are discharged untreated into the Quinebaug River at times of storm.

The capacity of the sewage disposal works at Westborough has been considerably overtaxed during the year due partly to the reconstruction of these works. The filtering material was removed from three of the beds and at the end of the year they had not been refilled with satisfactory filtering material. Three filter beds were reconstructed in 1929 and these beds were in use during the latter part of 1930 together with a new bed partially constructed during 1929. An additional area of filter beds is needed at this plant and provision has been made for the construction of new filter beds during the coming year.

The new disposal works at Winchendon have been effectively operated throughout the year.

At Worcester the sewage disposal works consisting of Imhoff tanks, trickling filters and secondary tanks continue to be effectively operated.

The results of the operation of the other municipal sewage disposal works have been much the same as in previous years. The dry weather flow of the sewage at practically all the plants has been less and the sewage has been stronger than is usually the case.

The results of the analyses of sewage and effluent together with statistics covering the more important sewage disposal works are appended in the following tables: —



TABLE No. 1. — Average Results of the Analyses of Monthly Samples of Sewage as received at Disposal Works. (Fats determined in about 59 Per Cent of the Samples)

[Parts in 100,000]

City or Town	Residue on Evaporation					Ammonia			Chlorine		Oxygen Consumed		Iron		Kjeldahl Nitrogen	Fats
	Total Residue			Loss on Ignition		Free	Albuminoid		Unfiltered	Filtered	Unfiltered	Filtered	Unfiltered	Filtered		
	Total	Dissolved	Suspended	Total	Dissolved		Suspended									
Attleboro <sup>1</sup>	33.76	26.90	6.86	16.73	10.87	5.86	2.98	.40	.28	.12	3.52	2.14	.116	.053	.94	7.48
Brockton <sup>1</sup>	32.06	35.51	16.55	28.64	14.71	13.93	4.96	.66	.38	.28	7.70	4.10	.105	.042	1.59	6.33
Clinton <sup>2</sup>	128.62	80.35	48.27	74.90	38.65	36.25	3.63	1.42	.93	.49	16.28	9.54	.265	.127	3.10	31.87
Concord <sup>1</sup>	32.13	24.40	7.73	18.17	11.53	6.64	2.70	.42	.29	.18	4.07	2.49	.084	.040	1.15	—
Easthampton <sup>1</sup>	63.85	44.40	19.45	36.25	19.40	16.85	4.20	.64	.35	.29	6.62	3.37	.101	.038	1.53	—
Fitchburg	42.27	28.16	14.11	23.53	12.34	11.19	2.44	.42	.25	.17	5.23	3.88	.205	.091	1.03	7.98
Frammingham (Imhoff) <sup>3</sup>	80.38	51.97	28.41	47.12	26.62	20.52	4.50	1.06	.73	.33	10.50	5.87	.209	.086	2.11	11.54
Frammingham <sup>2</sup>	105.15	66.73	38.42	60.84	36.62	24.22	4.57	1.62	1.14	.48	11.73	6.33	.245	.080	3.17	11.83
Franklin <sup>1</sup>	45.78	30.07	15.69	25.43	12.40	13.03	2.62	.45	.29	.16	4.70	2.59	.086	.043	1.10	—
Gardner (Gardner Area)	98.53	67.00	31.53	51.67	26.20	25.47	8.88	1.58	1.11	.47	11.75	5.86	.175	.048	3.18	13.44
Gardner (Templeton Area)	70.63	47.63	23.00	42.20	22.00	20.20	8.96	1.20	.82	.38	8.82	4.75	.138	.062	2.47	9.45
Hopedale <sup>2</sup>	59.53	46.17	13.36	31.23	20.27	10.96	5.64	.73	.36	.17	6.82	4.55	.374	.100	1.63	—
Hudson <sup>1</sup>	59.94	43.05	16.89	34.67	20.56	14.11	6.54	.95	.60	.35	8.45	4.86	.239	.132	1.95	8.49
Leicester <sup>4</sup>	40.47	36.03	4.44	20.67	17.30	3.37	2.80	.38	.30	.08	5.50	3.82	.078	.038	.87	—
Marion <sup>1</sup>	33.68	28.56	5.12	18.84	14.52	4.32	2.63	.42	.33	.09	5.65	3.44	.106	.058	.93	—
Marlborough	74.77	49.20	25.57	45.52	23.25	22.27	5.16	1.12	.66	.46	6.51	4.51	.201	.084	2.16	12.90
Maynard <sup>5</sup>	41.50	27.10	14.40	23.30	13.30	10.00	3.48	.57	.36	.21	6.35	3.15	.124	.056	1.11	—
Milford	54.02	36.86	17.16	30.17	15.54	14.63	5.59	.79	.51	.28	5.40	3.92	.099	.052	1.61	—
Natick <sup>2</sup>	58.04	35.22	22.82	34.00	14.00	20.00	2.69	.79	.40	.39	4.76	2.74	.132	.033	1.76	7.16
North Attleborough <sup>1</sup>	37.60	25.40	12.20	20.07	9.50	10.57	2.29	.37	.24	.13	3.45	1.91	.118	.038	.92	—
Northbridge	46.73	28.80	17.93	28.53	13.45	15.08	5.35	.83	.57	.26	6.67	3.27	.120	.039	1.84	—
Norwood	85.26	57.27	27.99	42.33	20.40	21.93	3.63	.72	.37	.35	9.39	5.45	.151	.058	1.53	9.79
Pittsfield <sup>2</sup>	50.51	39.45	11.06	26.98	17.63	9.35	2.61	.46	.32	.14	6.43	4.10	.141	.036	1.17	5.22
Southbridge <sup>1</sup>	76.56	43.90	32.66	47.43	21.83	25.60	7.27	1.12	.76	.36	5.28	4.43	.155	.054	2.46	10.90
Spencer	98.36	41.24	57.12	70.04	22.24	47.80	4.18	1.55	.67	.88	10.28	4.58	.286	.085	3.34	14.16
Stockbridge <sup>4</sup>	24.45	22.35	2.10	12.80	10.80	2.00	2.20	.27	.15	.12	2.23	1.32	.047	.027	.59	—
Westborough	60.71	42.40	18.31	35.51	20.74	14.77	4.74	.83	.57	.26	4.49	3.85	.145	.066	1.80	10.79
Winchendon <sup>4</sup>	100.53	33.13	67.40	72.27	15.73	56.54	3.23	1.12	.58	.54	9.70	2.55	.350	.099	2.69	—
Worcester	92.56	57.51	35.05	53.84	14.76	21.08	2.51	.59	.21	.38	10.20	4.02	2.410	.515	1.46	8.01

<sup>1</sup> Six samples.

<sup>2</sup> At pumping station.

<sup>3</sup> Entrance to Imhoff tanks, including Saxonville sewage.

<sup>4</sup> Four samples.

<sup>5</sup> Two samples.

TABLE No. 2. — Average Results of the Analyses of Monthly Samples of Sewage as Applied to Filter Beds after Preliminary Treatment as Indicated.  
(Fats determined in about 59 Per Cent of the Samples)  
[Parts in 100,000]

CITY OR TOWN	Form of Preliminary Treatment	RESIDUE ON EVAPORATION				AMMONIA			OXYGEN CONSUMED		IRON		Kjeldahl Nitrogen	Fats		
		TOTAL RESIDUE		LOSS ON IGNITION		Free	ALBUMINOID		Unfiltered	Filtered	Unfiltered	Filtered				
		Total	Dissolved	Suspended	Total		Dissolved	Suspended								
ATTLEBORO <sup>1</sup>	None	33.76	26.90	6.86	16.73	10.87	5.86	2.98	.40	.28	.12	2.91	.116	.053	.94	7.48
BROCKTON	Tanks	41.51	34.69	6.82	20.02	14.35	5.67	4.26	.31	.14	.14	6.17	.173	.055	1.43	4.38
Clinton	Basins	68.47	55.70	12.77	32.15	24.07	8.08	3.28	.67	.41	.26	6.76	.166	.115	1.43	11.07
Concord <sup>1</sup>	None	32.13	24.40	7.73	18.17	11.53	6.64	2.70	.47	.29	.18	2.79	.084	.040	1.15	-
Easthampton	Tanks	48.00	35.85	12.15	26.00	16.25	9.75	3.93	.62	.31	.31	4.79	.063	.024	1.19	-
FITCHBURG	Imhoff	31.11	28.02	3.09	13.80	11.69	2.21	2.66	.33	.22	.11	3.99	.161	.096	.87	3.73
Framingham	Imhoff	53.30	46.76	6.54	27.13	22.03	5.10	5.10	.67	.53	.14	5.49	.173	.102	1.43	6.18
Franklin	Tanks	37.40	34.66	2.74	14.83	12.63	2.20	3.09	.35	.25	.10	6.87	.081	.041	.71	-
GARDNER (Gardner Area)	None	98.53	67.00	31.53	51.67	26.20	25.47	8.88	1.58	1.11	.47	9.87	.175	.048	3.18	13.44
GARDNER (Templeton Area)	Tanks	42.95	35.86	7.09	22.18	16.18	6.00	4.68	.58	.35	.18	5.43	.129	.080	1.21	6.03
Hopedale <sup>1</sup>	Tanks	36.60	31.27	5.33	19.43	14.70	4.73	4.57	.43	.26	.17	4.12	.205	.093	1.00	-
Hudson	Tanks	47.25	38.93	8.32	25.00	17.69	7.31	5.75	.62	.46	.16	5.91	.179	.077	1.25	5.56
Leicester <sup>2</sup>	None	40.47	36.03	4.44	20.67	17.30	3.37	2.80	.38	.30	.08	4.15	.550	.382	.87	-
Marion <sup>1</sup>	None	33.68	28.56	5.12	18.84	14.52	4.32	2.63	.42	.33	.09	4.92	.106	.058	.93	-
MARLBOROUGH	Tanks	58.38	47.43	10.95	30.93	20.92	10.01	5.34	.78	.51	.27	6.50	.132	.068	1.54	8.41
Maynard <sup>3</sup>	Imhoff	32.70	30.80	1.90	15.60	14.50	1.10	4.48	.31	.21	.10	5.10	.370	.095	.65	-
Milford	Tanks	43.90	39.23	4.67	21.20	17.17	4.03	4.11	.39	.26	.13	5.66	.096	.052	.92	-
Milford	Imhoff	34.65	30.36	4.29	14.73	11.48	3.25	3.87	.35	.26	.09	4.76	.323	.211	.081	-
Natick	None	58.04	35.22	22.82	34.00	14.00	20.00	2.69	.79	.40	.39	4.76	.665	.274	.132	7.16
North Attleborough <sup>1</sup>	Tanks	27.00	24.60	2.40	11.33	9.53	1.80	2.15	.27	.20	.07	2.92	.192	.050	.62	-
Northbridge	Tanks	20.63	18.87	1.76	9.85	8.57	1.28	1.94	.22	.13	.09	2.80	.075	.040	.61	-
Norwood	Tank	62.62	47.94	14.68	29.30	18.96	10.34	3.76	1.02	.43	.59	10.65	.948	.451	1.45	7.00
PIRTSFIELD	None	50.51	39.45	11.06	26.98	17.63	9.35	2.61	.46	.32	.14	5.00	.141	.036	1.17	5.22
Southbridge <sup>1</sup>	Tanks	41.13	33.50	7.63	22.07	15.90	6.17	3.51	.49	.30	.19	4.05	.332	.072	1.06	5.96
Spencer <sup>1</sup>	None	98.36	41.24	57.12	70.04	22.24	47.80	4.18	1.55	.67	.88	4.64	.286	.085	3.34	14.16
Stockbridge <sup>2</sup>	None	24.45	22.35	2.10	12.80	10.80	2.00	2.20	.27	.15	.12	1.67	.047	.027	.59	-
Westborough	Tanks	60.71	42.40	18.31	35.51	20.74	14.77	4.74	.83	.57	.26	4.49	.145	.066	1.80	10.79
Winchendon <sup>2</sup>	None	34.45	30.85	3.60	15.00	12.00	3.00	3.74	.33	.24	.09	5.29	.164	.113	.84	-
WORCESTER	Imhoff	70.65	55.85	14.80	20.00	11.45	8.55	2.85	.30	.15	.15	10.63	.200	.216	.76	3.10

<sup>1</sup> Six samples.<sup>2</sup> Four samples.<sup>3</sup> Two samples.

TABLE No. 3. — *Efficiency of Settling Tanks and Other Forms of Preliminary Treatment as Indicated by the Foregoing Tables.*  
[Parts in 100,000]

CITY OR TOWN	Form of Preliminary Treatment	SUSPENDED SOLIDS			TOTAL ALBUMINOID AMMONIA			OXYGEN CONSUMED			FATS <sup>1</sup>		CHLORINE	
		Raw Sewage	Settled or treated Sewage	Per Cent removed	Raw Sewage	Settled or treated Sewage	Per Cent removed	Raw Sewage	Settled or treated Sewage	Per Cent removed	Raw Sewage	Settled or treated Sewage	Raw Sewage	Settled or treated Sewage
BROCKTON	Tanks	16.55	6.82	59	.66	.45	32	7.70	5.63	27	6.33	4.38	6.26	6.17
Clinton	Basins	48.27	12.77	74	1.42	.67	53	16.28	6.69	59	31.87	11.07	7.39	6.76
Easthampton	Tanks	19.45	12.15	38	.64	.62	3	6.62	5.62	15	—	—	6.92	4.79
Fitchburg	Imhoff	14.11	3.09	78	.42	.33	22	5.23	3.88	26	7.98	3.73	3.88	3.99
Framingham <sup>2</sup>	Imhoff	28.41	6.54	77	1.06	.67	37	10.50	8.85	16	11.54	6.18	5.20	5.49
Franklin	Tanks	15.69	2.74	83	.45	.35	22	4.70	3.82	19	—	—	3.81	6.87
GARDNER (Templeton Area)	Tanks	23.00	7.09	69	1.20	.58	52	8.82	4.72	46	9.45	6.03	7.22	5.43
Hopedale	Tanks	13.36	5.33	60	.73	.43	41	6.82	4.55	33	—	—	5.35	4.12
Hudson	Tanks	16.89	8.32	51	.95	.62	35	8.45	5.41	36	8.49	5.56	6.22	5.91
MALBOROUGH	Tanks	25.57	10.95	57	1.12	.78	30	9.10	7.81	14	12.90	8.41	6.51	6.50
Maynard	Imhoff	14.40	1.90	87	.57	.31	46	6.35	3.70	42	—	—	4.00	5.10
Milford	Tanks	17.16	4.67	73	.79	.39	51	5.92	4.28	28	—	—	5.40	5.66
Milford	Imhoff	17.16	4.29	75	.79	.35	56	5.92	3.23	45	—	—	5.40	4.76
North Attleborough	Tanks	12.20	2.40	80	.37	.22	27	3.45	3.15	9	—	—	3.20	2.92
Northbridge	Tanks	17.93	1.76	90	.83	.27	73	6.67	2.78	58	—	—	4.38	2.80
Norwood	Tank	27.93	14.68	48	.72	1.02	—	9.39	8.98	4	9.79	7.00	13.25	10.65
Southbridge	Tanks	32.66	7.63	56	1.12	.49	45	9.11	5.02	45	10.90	5.96	5.28	4.05
Winchendon	Tanks	67.40	3.60	95	1.12	.33	71	4.70	3.35	29	—	—	3.90	5.29
WORCESTER	Imhoff	35.05	14.80	58	.59	.30	49	10.70	5.90	45	8.01	3.10	10.20	10.63

<sup>1</sup> Fats determined in about 59 per cent of samples.

<sup>2</sup> The analyses of the comparatively small quantity of sewage from Saxonville not used in determining the efficiency of these tanks.



TABLE NO. 4. — *Average Results of the Analyses of Monthly Samples of Sewage applied to the Trickling Filters at Brockton, Fitchburg, Maynard, Milford and Worcester, and their Effluents, etc., Per Cent Removed, etc.*

[Parts in 100,000]

## Brockton

	RESIDUE ON EVAPORATION						AMMONIA				Chlorine	NITROGEN AS —		OXYGEN CONSUMED		Kjeldahl Nitrogen	Fats	REMARKS
	TOTAL RESIDUE			LOSS ON IGNITION			Free	ALBUMINOID				Nitrates	Nitrites	Unfiltered	Filtered			
	Total	Dissolved	Suspended	Total	Dissolved	Suspended												
Settled sewage as applied to trickling filter.	41.51	34.69	6.82	20.02	14.35	5.67	4.26	.45	.31	.14	6.17	-	-	5.63	3.68	1.14	4.38	Trickling filter has an area of 2.0 acres and a depth of 10 feet of stone from 1.5 to 3 inches in size.
Effluent from trickling filter.	57.78	45.27	12.51	27.54	17.96	9.58	2.47	.35	.15	.20	7.33	2.1162	.0297	4.97	2.51	.89	1.68	One half of filter used alternately. The average rate of operation was about 1,232,000 gallons per acre per day
Per cent removed - Settled effluent from trickling filter.	45.85	41.43	4.42	18.73	15.16	3.57	42	22	52	-	-	1.8440	.0389	3.82	2.37	22	62	Period of sedimentation averaged about 2.21 hours.
Per cent removed secondary settling tank.	21	8	65	32	16	63	8	29	7	45	-	-	-	23	6	29	17	
Per cent removed by trickling filter and secondary settling tank.	-	-	35	6	-	37	46	44	55	21	-	-	-	32	36	45	68	Tanks cleaned 104 times.

TABLE No. 4. — *Average Results of the Analyses of Monthly Samples of Sewage applied to the Trickling Filters at Brockton, Fitchburg, Maynard, Milford and Worcester, and their Effluents, etc., Per Cent Removed, etc. — Continued.*  
 [Parts in 100,000]  
*Fitchburg*

	RESIDUE ON EVAPORATION						AMMONIA				Chlorine	NITROGEN AS —		OXYGEN CONSUMED		Kjeldahl Nitrogen	Fats	REMARKS
	TOTAL RESIDUE			LOSS ON IGNITION			Free	ALBUMINOID				Nitrates	Nitrites	Unfiltered	Filtered			
	Total	Dissolved	Suspended	Total	Dissolved	Suspended												
Imhoff tank effluent as applied to trickling filter.	31.11	28.02	3.09	13.80	11.69	2.21	2.66	.33	.22	.11	3.99	-	-	3.88	2.80	.87	3.73	Trickling filter has an area of 2.14 acres and a depth of 10 feet of stone from 1 to 3 inches in size.
Effluent from trickling filter.	30.36	27.27	3.09	13.11	11.15	1.96	.79	.19	.09	.10	3.88	1.3456	.0477	2.57	1.55	.50	-	The average rate of operation was about 1,252,000 gallons per acre per day for area used (1.86 acres).
Per cent removed .	2	3	0	5	5	11	70	42	59	9	3	-	-	34	45	43	-	
Settled effluent from trickling filter as discharged to Nashua River.	30.45	27.09	3.36	12.78	10.95	1.83	.82	.14	.08	.06	3.89	1.5010	.0527	2.34	1.56	.43	-	
Per cent removed by secondary settling tanks.	-	7	-	3	2	7	-	26	11	40	-	-	-	9	-	14	-	Period of sedimentation about 9¾ hours.
Per cent removed by trickling filter and secondary settling tanks.	2	3	-	7	6	17	69	58	64	45	3	-	-	40	44	51	-	Tanks cleaned 8 times.

TABLE NO. 4. — *Average Results of the Analyses of Monthly Samples of Sewage applied to the Trickling Filters at Brockton, Fitchburg, Maynard, Milford and Worcester, and their Effluents, etc., Per Cent Removed, etc. — Continued*

[Parts in 100,000]

*Maynard*

	RESIDUE ON EVAPORATION						AMMONIA				Chlorine	NITROGEN AS —		OXYGEN CONSUMED		Kjeldahl Nitrogen	Fats	REMARKS
	TOTAL RESIDUE			LOSS ON IGNITION			Free	ALBUMINOID				Nitrates	Nitrites	Unfiltered	Filtered			
	Total	Dissolved	Suspended	Total	Dissolved	Suspended												
Imhoff tank effluent as applied to trickling filter.	32.70	30.80	1.90	15.60	14.50	1.10	4.48	.31	.21	.10	5.10	-	3.70	2.85	.65	-	Trickling filter has an area of .25 of an acre and a depth of 7 feet of stone from 1½ to 2½ inches in size. The average rate of operation was about 240,000 gallons per acre per day.	
Effluent from trickling filter.	50.30	38.80	11.50	20.70	18.80	1.90	.44	.11	.08	.03	4.80	1.5150	1.80	1.32	.24	-		
Per cent removed .	-	-	-	-	-	-	90	65	62	70	6	-	51	54	63	-		
Settled effluent from trickling filter as discharged to As-sabet River.	41.30	40.40	.90	19.70	19.10	.60	.38	.06	.05	.01	4.82	2.3000	1.28	1.17	.14	-		
Per cent removed by secondary settling tank.	-	-	92	5	-	68	14	45	38	67	-	-	29	11	42	-	Period of sedimentation about 8 hours.	
Per cent removed by trickling filter and secondary settling tank.	-	-	52	-	-	45	92	81	76	90	5	-	65	59	78	-	Tanks cleaned once.	



TABLE NO. 4. — Average Results of the Analyses of Monthly Samples of Sewage applied to the Trickling Filters at Brockton, Fitchburg, Maynard, Milford and Worcester, and their Effluents, etc., Per Cent Removed, etc. — Continued

[Parts in 100,000]

Milford

	RESIDUE ON EVAPORATION						AMMONIA			Chlorine	NITROGEN AS —		OXYGEN CONSUMED		Kjeldahl Nitrogen	Fats	REMARKS	
	TOTAL RESIDUE			LOSS ON IGNITION			Free	ALBUMINOID			Nitrates	Nitrites	Unfiltered	Filtered				
	Total	Dissolved	Suspended	Total	Dissolved	Suspended												
Imhoff tank effluent as applied to trickling filter.	34.65	30.36	4.29	14.73	11.48	3.25	3.87	.35	.26	.09	4.76	.1102	.0146	3.23	2.11	.74	-	Trickling filter has an area of .28 of an acre and a depth of 6 feet of stone from 1 to 1¼ inches in size.
Effluent from trickling filter.	35.90	32.78	3.12	14.75	12.40	2.35	1.03	.16	.07	.09	4.71	1.9258	.0167	1.85	1.09	.35	-	
Per cent removed .	-	-	27	-	-	28	73	54	73	0	1	-	-	75	48	53	-	
Settled effluent from trickling filter as discharged to Charles River.	35.70	32.18	3.52	13.80	11.31	2.49	1.11	.16	.07	.09	4.95	1.8797	.0187	1.70	1.17	.32	-	
Per cent removed by secondary settling tank.	6	2	-	6	9	-	-	0	0	0	-	-	-	8	-	9	-	
Per cent removed by trickling filter and secondary settling tank.	-	-	18	6	1	23	71	54	73	0	-	-	-	47	45	57	-	

TABLE NO. 4 — *Average Results of the Analyses of Monthly Samples of Sewage applied to the Trickling Filters at Brockton, Fitchburg, Maynard, Milford and Worcester, and their Effluents, etc., Per Cent Removed, etc. — Concluded.*

[Parts in 100,000]

*Worcester*

	RESIDUE ON EVAPORATION						AMMONIA			Chlorine	NITROGEN AS —		OXYGEN CONSUMED		Kjeldahl Nitrogen	Fats	REMARKS	
	TOTAL RESIDUE			LOSS ON IGNITION			Free	ALBUMINOID			Nitrates	Nitrites	Unfiltered	Filtered				
	Total	Dissolved	Suspended	Total	Dissolved	Suspended												
Imhoff tank effluent as applied to trickling filters.	70.65	55.85	14.80	20.00	11.45	8.55	2.85	.30	.15	.15	10.63	5.90	3.03	.76	3.10	Trickling filters have an area of 13.68 acres and a depth of 10 feet of stone from 1¼ to 3 inches in size.		
Effluent from trickling filters.	70.75	57.84	12.91	18.11	11.62	6.49	1.15	.25	.08	.17	11.27	3.69	1.44	.61	1.50	The average rate of operation was about 1,258,000 gallons per acre per day.		
Per cent removed .	—	—	13	9	—	24	60	17	47	—	—	37	52	20	52			
Settled effluent from trickling filters as discharged to Blackstone River.	62.98	55.34	7.64	14.22	10.65	3.57	1.08	.17	.07	.10	11.08	2.88	1.60	.41	1.20			
Per cent removed by secondary settling tanks.	11	4	41	21	8	45	6	32	13	41	2	22	—	33	20	Period of sedimentation averaged about 3.3 hours.		
Per cent removed by trickling filters and secondary settling tanks.	11	9	48	29	7	58	62	43	53	33	—	51	47	46	61	Tanks cleaned 9 times.		

TABLE NO. 5. — *Average Results of Analyses of Monthly Samples of Effluent from Sand Filters*  
[Parts in 100,000]

CITY OR TOWN	Free Ammonia	Total Albuminoid Ammonia	Chlorine	NITROGEN AS —		Iron
				Nitrates	Nitrites	
ATTLEBORO <sup>1</sup>	.73	.0570	3.80	1.4300	.0271	.031
BROCKTON <sup>2</sup>	1.12	.0473	8.00	2.6784	.0193	.112
Clinton <sup>2</sup>	1.53	.0636	5.64	1.597	.0069	1.358
Concord <sup>1</sup>	.12	.0263	2.78	1.6648	.0032	.026
Easthampton <sup>1</sup>	1.43	.0862	3.47	.9297	.0162	.058
Framingham (Imhoff)	1.88	.0900	5.64	.9207	.0210	.561
Framingham (direct)	2.62	.1042	5.69	.4633	.0196	.801
Franklin	1.12	.1165	5.14	.5255	.0220	.128
GARDNER (Gardner Area) <sup>3</sup>	3.88	.2190	7.60	1.8697	.0447	.380
GARDNER (Templeton Area) <sup>2</sup>	4.79	.1532	6.00	.1286	.0049	1.134
Hopedale <sup>2</sup>	1.11	.0517	3.84	2.4162	.0021	.020
Hudson	2.95	.2300	5.81	.8607	.0163	.395
Leicester <sup>3</sup>	1.74	.1154	3.67	.6265	.1110	.084
Marion	.28	.0306	4.20	1.4748	.0317	.273
MARLBOROUGH <sup>2</sup>	1.19	.0638	5.74	1.9288	.0171	.146
Milford	2.38	.0805	5.43	1.0773	.0137	.364
Nantucket <sup>4</sup>	.56	.0320	5.85	.0360	.0030	.400
Natick	3.43	.1040	6.88	.2476	.0106	.601
North Attleborough <sup>1</sup>	.91	.0377	2.52	.2612	.0090	.322
Northbridge	.28	.0351	3.02	1.3522	.0149	.043
Norwood <sup>2</sup>	1.01	.0548	8.39	.4906	.0133	.248
PITTSFIELD	1.99	.2067	4.13	.1067	.0053	.375
Southbridge <sup>2</sup>	3.33	.0760	4.93	.0220	.0009	.834
Spencer <sup>1</sup>	1.44	.0687	3.92	.0420	.0004	1.760
Stockbridge <sup>2</sup>	.25	.0362	1.94	.6227	.0075	.117
Westborough <sup>2</sup>	1.5776	.0669	6.81	.2904	.0166	.444
Winchendon <sup>3</sup>	.6500	.0260	2.25	.4790	.0065	.084

<sup>1</sup> Six samples.<sup>2</sup> Regular samples from two or more underdrains in one average.<sup>3</sup> Four samples.<sup>4</sup> One sample.

TABLE NO. 6. — *Efficiency of Sand Filters (Per Cent of Free and Albuminoid Ammonia Removed)*  
[Parts in 100,000]

CITY OR TOWN	FREE AMMONIA			TOTAL ALBUMINOID AMMONIA			CHLORINE		Rate of Operation with Even Distribution (Gallons per Acre per Day) <sup>1</sup>
	Applied Sewage	Effluent	Per Cent Removed	Applied Sewage	Effluent	Per Cent Removed	Applied Sewage	Effluent	
ATTLEBORO	2.98	.73	75	.40	.0570	86	2.91	3.80	59,000
BROCKTON	4.26	1.12	74	.45	.0473	89	6.17	8.00	—
Clinton	3.28	1.53	53	.67	.0636	91	6.76	5.64	40,000
Concord	2.70	.12	96	.47	.0263	94	2.79	2.78	68,000
Easthampton	3.93	1.43	64	.62	.0862	86	4.79	3.47	—
Framingham (Imhoff)	5.10	1.88	63	.67	.0900	87	5.49	5.64	34,000
Framingham (direct)	4.57	2.62	43	1.62	.1042	94	6.45	5.69	
Franklin	3.09	1.12	64	.35	.1165	67	6.87	5.14	59,000
GARDNER (Gardner Area)	8.88	3.88	56	1.58	.2190	86	9.87	7.60	—
GARDNER (Templeton Area)	4.68	4.79	—	.53	.1532	71	5.43	6.00	—
Hopedale	4.57	1.11	76	.43	.0517	88	4.12	3.84	35,000
Hudson	5.75	2.95	49	.62	.2300	63	5.91	5.81	54,000
Leicester	2.80	1.74	38	.38	.1154	70	4.15	3.67	—
Marion	2.63	.28	89	.42	.0306	93	4.92	4.20	59,000
MARLBOROUGH	5.34	1.19	78	.78	.0638	92	6.50	5.74	41,000
Milford	4.11	2.38	42	.39	.0805	79	5.66	5.43	—
Natick	2.69	3.43	—	.79	.1040	87	4.76	6.88	44,000
North Attleborough	2.15	.91	58	.27	.0377	86	2.92	2.52	—
Northbridge	1.94	.28	86	.22	.0351	84	2.80	3.02	62,000
Norwood	3.76	1.01	73	1.02	.0548	95	10.65	8.39	—
PITTSFIELD	2.61	1.99	24	.46	.2067	55	5.00	4.13	100,000
Southbridge	3.51	3.33	5	.49	.0760	84	4.05	4.93	63,000
Spencer	4.18	1.44	66	1.55	.0687	96	4.64	3.92	—
Stockbridge	2.20	.25	89	.27	.0362	87	1.67	1.94	—
Westborough	4.74	1.58	67	.83	.0669	92	4.49	6.81	—
Winchendon	3.74	.65	83	.33	.0260	92	5.29	2.25	—

<sup>1</sup> See also Table No. 7.

TABLE No. 7. — *Extent of Sewerage Works, Rate of Flow, and Rate of Operation of Sand Filters*

CITY OR TOWN	Popula- tion, Census of 1930	Approxi- mate Length of Sanitary Sewers (Miles)	Approxi- mate Number of House Con- nections	ESTIMATED QUANTITY OF SEWAGE TREATED (GALLONS PER DAY)			Estimated Average Quantity of Sewage per Con- nection	Net Area of Filter Beds (Acres)	Estimated Rate of Operation with Even Dis- tribution (Gallons) per Acre per Day)
				Average for Year	Average for Month of Maximum Flow	Average for Month of Minimum Flow			
ATTLEBORO	21,769	37.14	1,756	912,000	1,194,000	677,000	519	15.50	59,000
BROCKTON	63,797	103.82	8,476	2,756,000 <sup>1</sup>	4,001,000	1,779,000	—	—	—
Clinton	12,817	24.90	1,907	1,046,000 <sup>2</sup>	1,284,000	1,016,000	549	26.23	40,000
Concord	7,477	17.46	655	370,000	495,000	224,000	515	5.48	68,000
Easthampton	11,323	—	—	—	—	—	—	2.20	—
FITCHBURG	40,692	78.00	—	2,329,000	—	—	—	—	—
Frammingham	22,210	41.50	3,429	976,000	1,180,000	874,000	285	29.12	31,000
Franklin	7,028	14.20	831	192,000	265,000	91,000	231	3.24	59,000
GARDNER	19,399	35.60	2,474	—	—	—	—	—	—
Hopedale	2,973	7.08	369	132,000 <sup>3</sup>	174,000	121,000	358	3.79	35,000
Hudson	8,469	14.63	1,121	490,000	646,000	379,000	437	9.00	54,000
Marion	1,638	4.00	209	113,000	197,000	65,000	541	1.93	59,000
MARLBOROUGH	15,887	35.89	2,618	818,000	1,355,000	613,000	312	20.19	41,000
Maynard	7,156	7.50	180	60,000	—	—	333	—	—
Milford	14,741	25.18	1,741	353,000 <sup>4</sup>	454,000	149,000	—	9.30	38,000
Nantucket	3,678	—	—	387,000	481,000	357,000	—	4.00	97,000
Natick	13,589	14.07	1,648	557,000	752,000	425,000	338	12.60	44,000
North Attleborough	10,197	17.60	1,006	—	—	—	—	—	—
Northbridge	9,713	15.93	970	748,000	990,000	556,000	771	12.00	62,000
Norwood	15,049	27.40	1,983	—	—	—	—	14.47	—
PITTSFIELD	49,677	76.67	6,540	4,102,000	4,459,000	4,027,000	627	41.15	100,000
Southbridge	14,264	19.00	1,315	791,000	825,000	752,000	602	12.50	63,000
Westborough	6,409	9.11	605	221,000	346,000	158,000	365	—	—
Winchendon	6,202	—	—	—	—	—	—	4.00	—
WORCESTER	195,311	340.73 <sup>5</sup>	—	17,200,000	—	—	—	—	—

<sup>1</sup> Includes an average of 2,464,000 gallons per day to trickling filter and 292,000 gallons to sand filters.  
<sup>2</sup> Entire quantity of sewage not treated.

<sup>3</sup> New development not included in average.

<sup>4</sup> Records questionable. Amount treated by sand filters only.

<sup>5</sup> Includes 70.01 miles of combined sewers.



TABLE No. 8. — *General Features*

CITY or TOWN	Year of Construction of and Additions to Works	Depth of Under-drains (Feet)	Distance Apart of Under-drains (Feet)	Filtering Material	Attention given to Disposal Works
ATTLEBORO	1812, 1913	4-7	35	Excellent sand and gravel; found in place	One man all the time; others when necessary.
BROCKTON	1893, 1905	5.5	30	Good sand and gravel; found in place	One chemist in charge, foreman, day and night man; more when necessary.
Clinton	1898, 1899	8	60-70	Good sand and gravel; found in place	Two men all the time; others when necessary.
Concord	1899, 1928	none	—	Good sand underlaid with gravel; found in place	One man once a day.
Easthampton	1908	3.5	20-40	Good sand and gravel; largely found in place	One man all the time; others when necessary.
FITCHBURG	1914	—	—	Trickling filter — 10 feet deep	Chemist in charge; 1 foreman, 1 day and 2 night men.
Framingham	1890, 1924	—	—	Good sand and gravel	One man all the time; others when necessary.
Franklin	1915	4.5	26	Good sand and gravel	Very little attention; one man once in a while.
GARDNER (Gardner Area)	1891	5	20	Good sand; handled in construction	One man all the time; others when necessary.
GARDNER (Templeton Area)	1901, 1909	3-4	20-30	Coarse sand; handled in construction	One man all the time; others when necessary.
Hopedale	1900, 1923	3	35-60	Good material — sand and gravel	One man all the time; others when necessary.
Hudson	1904, 1910	5-6	50-100	Good sand and gravel; found in place	One man all the time; others when necessary.
Leicester	1894, 1928	4	8	Mostly good sand; handled in construction	Very little attention.
Marion	1906	5	—	Mostly good sand; pockets of fine sand and some ledge; largely found in place	One man every day in summer, every other day in winter.
MARLBOROUGH	1891, 1908, 1909, 1910, 1911	4.5-6	30-50	Rather fine sand; found in place	One man all the time; others when necessary.
Maynard	1929	—	—	Trickling filter, 7 feet deep	One man all the time.
Milford	1907, 1924	5	40	Rather fine sand; found in place; trickling filter	One man every day; others when necessary.
Nantucket	1930	—	—	Good sand and gravel found in place	One man when necessary.
Natick	1898	6	36	Sand of good quality, but stratified; found in place	One man all the time; others when necessary.
North Attleborough	1909, 1910	5-6.5	55	Coarse sand and gravel; found in place	One man every day; others when necessary.
Northbridge	1906, 1907, 1920	4	50-75	Coarse sand and gravel; mostly handled	Two men all the time; others when necessary.
Norwood	1909, 1918, 1923, 1924	4-6	40	Good sand and gravel; partly handled	One man all the time; others when necessary.
PITTSFIELD	1901, 1915	4	35	Good sand; mostly found in place	Two men all the time; others when necessary.
Southbridge	1908, 1925, 1926	4	40	Fair sand and gravel; considerable quantity handled, some found in place.	One man part of every day.
Spencer	1897, 1923	— <sup>1</sup>	—	Good sand and gravel; largely found in place	One man all the time; others when necessary.
Stockbridge	1899, 1921, 1922	3-4.5	23	Sand filters, good quality sand	One man all the time.
Westborough	1892, 1911	3.4-5	30	Irrigation area, rather fine sand	One man all the time.
Winchendon	1928	—	30-40	Good sand and gravel, handled in construction	One man all the time; others when necessary.
WORCESTER	1898 ? <sup>2</sup> , 1925	—	—	Good sand and gravel found in place	One man part time.
		4-6	35-50	Trickling filters, sand area not in use	Chemist in charge; several men all the time.

<sup>1</sup> Only three beds underdrained.<sup>2</sup> Year of first construction of sand filters.

Many additions.

\* Sedimentation tanks and sand beds abandoned June, 1925. Imhoff tanks, trickling filters and secondary tanks installed.

## EXAMINATION OF SEWER OUTLETS DISCHARGING INTO THE SEA

No special examinations of sea outfalls were made during the year except in connection with the special examination of Boston Harbor mentioned elsewhere in this report.

## INVESTIGATIONS RELATIVE TO SHELLFISH

Investigations have been made to determine the extent of contamination at various points along the sea coast during the year, and the restrictions were removed from certain parts of Quincy Bay, certain changes were made at Ipswich, and late in the year restrictions were placed on the taking of shellfish from Pines River in Revere and Saugus.

Shellfish from polluted areas about New Bedford were transplanted at Fairhaven during the warmer part of the year under the supervision of the Division of Fisheries and Game of the Department of Conservation.

The Pioneer Fisheries Company of Plymouth started chlorinating clams on May 23, 1930, and the plant is still in operation. The municipal plant at Newburyport has been in constant operation since September 19, 1930. These two plants are operated under the supervision of the Department, and daily analyses indicate satisfactory results.

## REPORT OF THE DIVISION OF TUBERCULOSIS

ALTON S. POPE, M.D., *Director.*LOUIS N. PHANEUF, *Assistant Director.*PAUL WAKEFIELD, M.D., *Chief of Clinics.*

I have the honor to submit the eleventh annual report of the Division of Tuberculosis. This report consists of an outline of the major activities of the Division for the fiscal year ending November 30, 1930, together with certain developments in policy.

In spite of the fact that the five-year building program for state sanatoria adopted in 1928 has already been nearly completed and that the tuberculosis death rate in Massachusetts has declined 75 per cent since 1900, we are still faced with the most acute shortage of tuberculosis beds in the history of the state. This anomalous situation is largely due to a growing appreciation of the value of sanatorium treatment on the part of the public. Five years ago only 35 per cent of the reported cases of tuberculosis in Massachusetts applied for hospital treatment; last year 55 per cent of the known cases applied for hospitalization. Contributing factors to this shortage of beds are: delay in the completion of the Middlesex and Worcester County Hospitals, which necessitates the continued hospitalization of the tuberculosis patients of those two counties at Rutland; the increased period of institutional treatment found advisable to secure arrest of the disease; progressive improvement in tuberculosis case finding throughout the state.

From the administrative standpoint this growing demand for hospital treatment is one of the most encouraging aspects of our tuberculosis campaign. To be truly effective sanatorium treatment of tuberculosis must be started early, yet even now only about 25 per cent of our adult cases are in an early, favorable stage of the disease when they reach the hospital. Economical hospitalization is early hospitalization. This means that even with a continued fall in the tuberculosis death rate our hospital building program will have to be maintained for several years to come.

Pending the completion of the Middlesex and Worcester County Hospitals it has been necessary to secure temporary hospital care for patients waiting for admission to Rutland. This situation has been met in part by the cooperation of various municipal, county and private hospitals which under legislative authority granted in 1928 have cared for a substantial number of patients seeking admission to the state sanatoria. One hundred and ten patients were so hospitalized during 1930. To the hospitals which have assisted in this emergency, we would express our sincere appreciation.

It is with profound regret that we record the resignation of Dr. Sumner H. Remick as Director of the Division. It is very largely to Dr. Remick's foresight, energy, and understanding of the problems of tuberculosis that we owe the recent rapid development of the State Sanatoria, and their present high standards. Middlesex County is to be congratulated in securing Dr. Remick's services as Superintendent of its new tuberculosis hospital.

Another important change in personnel was the appointment of Dr. John J. Poutas as epidemiologist of the Division. Dr. Poutas will assist with the important epidemiological studies of tuberculosis already begun.

## STATE SANATORIA

The four state sanatoria, Rutland, Westfield, North Reading and Lakeville, have provided 402,949 days of treatment for 2,023 patients. Of these cases 1,075 were in the institution at the beginning of the year and 948 represent new admissions. There were 11,788 more days' treatment provided than in 1929, but a decrease of 23 in the number of patients hospitalized. This is in line with sound hospital practice in the treatment of tuberculosis and represents adequate hospitalization in an increasing proportion of patients admitted. The per capita costs at the state sanatoria have varied but little from previous years. At Rutland during 1930 the average cost was \$16.66, at Westfield \$17.48, at North Reading \$19.88, and at Lakeville \$21.70 per capita per week.

The increasing use of thoracic surgery at Rutland has required the construction of a Medical and Surgical Building at that institution. This building, which includes an operating room, X-ray and fluoroscopy room, dark room, dental clinic



and out-patient clinic will be completed next spring. These facilities and the addition of a local surgical consultant will make it possible to do the greater part of the necessary surgery at the institution and to avoid the disadvantages of transferring patients to other hospitals.

At Westfield a separate house for the Superintendent is under construction and should be completed early in the spring. As soon as this is finished, the present superintendent's quarters in the Administration Building will be remodelled to furnish adequate quarters for X-ray equipment and the large out-patient department. It is hoped that an employees' building, so urgently needed at this institution, will be approved in the next budget. The construction of an additional school room at Westfield has released two rooms which have been equipped with four cubicles each for isolation quarters. This provision of adequate isolation facilities at each of the sanatoria for children, and the special training of a head nurse at each institution in the principles of medical asepsis, should be of great value in the control of outbreaks of a communicable disease.

At North Reading the Admission and Isolation Building was completed and dedicated on June 16th. Besides adding 73 beds to the capacity of the sanatorium, this building provides much needed facilities for the detention and observation of all newly admitted patients before they are allowed to mingle with the other children, as well as for effective isolation of such cases of communicable disease as may arise in the institution. The inclusion of 28 beds for infants and children under three in this building, provides facilities for the treatment of tuberculosis in young children not elsewhere available in Massachusetts. An addition of twelve rooms to the nurses' home relieves a serious shortage in living quarters at this institution and the completion of a forty-room dormitory for male employees next spring will make it possible to house the entire staff on the grounds.

At Lakeville a Children's Building of 72 beds was dedicated July 1st. This building also serves for the detention of newly admitted children, and for isolation purposes. The installation of a high-intensity carbon arc lamp in a special treatment room permits the treatment of 20 patients at a time, with ultra-violet rays, and makes possible the regular use of heliotherapy throughout the year. The admission of a larger proportion of seriously ill patients and the increasing use of surgery at this hospital make it urgent that additional single rooms be provided as promptly as possible. For these reasons, and because there are already a number of patients on the Lakeville waiting list, an infirmary building of 32 beds should be included in the 1931 budget. The Superintendent's house is now well under way, and its completion will release the Superintendent's present dwelling for much needed quarters for the medical staff.

During the past year many additional alterations and improvements have been made at all of the sanatoria. The fire protection program has been practically completed and the water supplies for fire and domestic purposes have been separated at all of the institutions. Even more important has been the steady improvement in the type of medical service given. Numerous consultants have from time to time been added to the medical staffs and accumulated experience in the treatment of tuberculosis has built up a type of service which I believe is not excelled by any similar sanatoria in the country. For this achievement the superintendents and their staffs deserve full credit and to them I wish to extend my sincere appreciation.

More detailed information concerning the sanatoria may be found in the annual reports of the superintendents which follow this report.

#### PONDVILLE HOSPITAL

This institution for the treatment of all forms of cancer has amply demonstrated the possibilities of a cancer hospital in the field of public health. Without in any way competing with the private or municipal hospitals, it provides an exceptionally high grade of diagnostic and therapeutic service in cancer to a group of patients who otherwise find it increasingly difficult to secure adequate treatment within their means. By the use of surgery, X-Ray and radium treatments, it has been possible to shorten the period of hospitalization and avoid the stagnation that too often occurs in a chronic disease hospital. During the past year the average stay of patients was only 46 days and 883 patients were treated in this small institution.



The rapidly mounting waiting list at Pondville required the addition of twenty-five beds during the past year. The new wing, which was dedicated on May 20th, also provides accommodations for the out-patient department and suitable laboratory facilities. One of the most gratifying features of Pondville has been the rapid growth of the Out-Patient Department. The average attendance at the weekly clinic last year was 27, already taxing the capacity of the new quarters.

The question of the further growth of Pondville should be seriously considered at this time. The 25 new beds provided last year were filled within a week and there are now some 40 patients on the Pondville waiting list. If this service to cancer patients is to be extended to keep pace with the demand, further additions to the hospital will be imperative by next year at the latest. A new service building is urgently needed for the present plant and it is hoped that the Department's request for such a building in the present budget will be approved. Next year an addition of 50 or 60 hospital beds will be necessary to meet the obligations which the State has assumed.

#### COUNTY AND MUNICIPAL HOSPITALS

The year has been notable for the fact that Middlesex and Worcester Counties have at last taken definite steps for the hospitalization of their own tuberculosis patients. Middlesex County Hospital, at Waltham, is nearing completion and expects to open its doors to patients about September 1, 1931. It will accommodate 200 patients. Preliminary work has been begun for the Worcester County Hospital at West Boylston, but the institution cannot open before the summer of 1932. The additional 315 beds provided by these two sanatoria should relieve the distressing shortage of accommodations for adult tuberculosis patients, which has existed in Massachusetts for the past three or four years. The men who have been selected as superintendents of these hospitals are the best possible guarantee of the type of service which will be given there.

The most difficult place to provide adequate care for the tuberculous is in the municipal and small county sanatorium. The relatively small number of patients tends to increase the per capita cost while the necessity of admitting many advanced cases results in a high death rate and often discourages the favorable patient who is hospitalized there. The most satisfactory solution of this problem, from both the economic and medical point of view is, I believe, the admission of all but one or two of the large cities of the state into the county hospital districts. In the case of the smaller counties, two or three might well unite in a hospital district as is now done in Hampshire County.

A marked advance in the county tuberculosis program is the introduction by the County Commissioners of a bill to authorize the county sanatoria to provide out-patient service and to furnish on request medical service to supplement the facilities of the towns in their districts for tuberculosis case finding. Massachusetts has long been a leader in the hospitalization of tuberculosis, but to use our sanatoria to the best advantage we must provide such local aids to diagnosis as will make it possible to find cases while they are still in the early, favorable stage.

#### SOCIAL SERVICE

Two years' experience with social service at our children's sanatoria has convinced us of the definite place of this work in our tuberculosis program. If we are to secure lasting benefit by treatment in a sanatorium, we must see that the patient returns to an environment in which he can hold the gains already made. Otherwise he is likely to break down shortly after his release and again become a burden on his family and the community. During the past year a social worker has gone into the home of each child admitted to Westfield and North Reading sanatoria to confer with the parents on suitable arrangements for the patient on his return. At Lakeville a similar investigation of home conditions has been made and the social workers have supplied valuable information on the condition of patients previously discharged. At Rutland the social workers have assisted with problem cases and in a number of instances have been able to solve family problems which otherwise would have caused the patient to leave the sanatorium prematurely.

The social workers have a weekly conference with the director to discuss problem cases and once a month meet with the staff of each sanatorium to keep in touch with patients there. Last spring a second worker was added to our staff and at least two more will be needed for the full development of this work.

## THE TEN YEAR PROGRAM

Following is the summary of the sixth years' work of the Chadwick Clinics:

Total school population of towns visited . . . . .	88,279
Number given Pirquet Test . . . . .	49,379
Number of reactors . . . . .	11,298
Number X-Rayed . . . . .	11,277
Number examined . . . . .	2,459
Number contacts examined . . . . .	309
Number diagnosed as Pulmonary Tuberculosis . . . . .	26
Number diagnosed as Pulmonary Tuberculosis Suspect . . . . .	16
Number diagnosed as Hilum Tuberculosis . . . . .	439
Number classified suspects . . . . .	1,065
Number cases of malnutrition . . . . .	117

The opening of the school year 1929-30 marked the beginning of the second half of the Ten Year Program for the detection and control of tuberculosis in children. During the preceding five years 101,000 children in the public and parochial schools of Massachusetts were examined by means of travelling clinics, and all but five or six cities and towns in the State had been visited. In the school year 1929-30 several communities, including Springfield and Chicopee, were visited for the second time. Due to a better understanding of the work of the clinic, and more careful preparation, a much greater number of examinations were secured than on the first clinic. In Springfield alone over 15,000 children were examined. Comparative epidemiological studies are now being made on the data of these two examinations. During the past year the clinic examinations were extended to include the high schools as well as the grade schools in the communities visited. The percentage of tuberculous infection as indicated by the Pirquet test was twice as high in the high schools as in the grades. The percentage of pulmonary tuberculosis found was approximately six times as great in the high schools. Unfortunately, it is much more difficult to get consents for examination of high school pupils, especially where there is any suspicion of illness, and if progress is to be made in the detection and control of tuberculosis at this most critical age period, additional means must be found to secure the interest and confidence of the pupils themselves.

It will be noticed in the preceding table that the total number of students tested for the year was nearly doubled, while the number examined is greatly reduced. This is due to the fact that the Pirquet test and the X-Ray are now being used as filters, the first to pick out the children infected, and the second to detect those who show some evidence of disease, past or present. This procedure makes it possible to avoid doing physical examinations on a great number of normal children, giving more attention to the children who really need it and at the same time increasing the capacity of the clinic.

Since the beginning of the present school year, the Director of the Chadwick Clinic has made it his practice to take the film of each child who shows X-Ray evidence of tuberculosis to that patient's family physician and discuss the case with him in person. Almost without exception this procedure has met with a cordial response on the part of the family physicians, and will, we feel sure, result in a better understanding of the purposes of the clinic among physicians, and accordingly secure much more adequate care of the children found to need treatment.

Cities visited in 1929-30: Acushnet, Agawam, Arlington, Chester, Chicopee, Ludlow, Marion, Medford, Monson, Somerville, and Springfield.

The work of the Follow-up Clinic, which re-examines annually all cases of tuberculosis or suspected tuberculosis previously found by the Chadwick Clinic, has grown so rapidly that it became necessary to add a third physician at the beginning of the present school year. Approximately 8,000 children were given re-examinations during the year, with re-tests and X-Rays in most instances. Although detailed studies of the Follow-up Clinic data have not yet been made, preliminary tabulations indicate that significantly more pulmonary tuberculosis is developing among the children found to have the childhood type of tuberculosis than in a control group of children.

## SUMMARY OF SIX YEARS' WORK

	Date	Number of Children examined	Number of Contacts examined	Number given Tuberculin Test	Number of Reactors	Per Cent of Reactors	Number of Children X-Rayed	Number of Cases of Pulmonary Tuberculosis	Per Cent of Pulmonary Cases of Number given Test	Number of Cases of Hilum Tuberculosis	Per Cent of Hilum Cases of the Number given Test	Number of Cases classified as Suspects
First year	1924-1925	10,648	1,612	10,016	2,927	29	3,008	31	.31	561	5.6	1,114
Second year	1925-1926	19,073	2,855	18,601	5,314	29	6,121 <sup>1</sup>	19	.1	621	3.3	1,399
Third year	1926-1927	19,527	2,367	19,194	5,188	27	6,338 <sup>1</sup>	29	.1	524	2.7	1,112
Fourth year <sup>2</sup>	1927-1928	26,177	913	26,052	7,219	28	7,909 <sup>1</sup>	8	.03	376	1.4	896
Fifth year	1928-1929	25,693	930	25,699	7,423	29	9,446 <sup>1</sup>	11	.04	415	1.6	848
Totals for first five years		101,118	8,777	99,562	28,071	28	32,822 <sup>1</sup>	98	.10	2,497	2.5	5,369
Sixth year <sup>3</sup>	1929-1930	2,459	309	49,379	11,298	23	11,277	26	.05	439	.9	1,065
Totals for six years	-	103,577	9,086	148,941	38,369	25.8	44,099	124	.08	2,936	1.9	6,434
Pulmonary Abscess												1
Pleurisy												2

<sup>1</sup> This figure includes X-Rays of Re-examinations, Summer Camp Children, Adults, and Special Requests.<sup>2</sup> The first three years an attempt was made to examine the contact cases and the children who were 10 per cent or more underweight.<sup>3</sup> These figures include the examinations of 7,318 high school students.



## TUBERCULOSIS STUDIES

Substantial progress has been made in the development of epidemiological studies based upon the records of the Chadwick and Follow-up Clinics, and upon morbidity and mortality records available in the Department. An epidemiologist has been added to the staff for these studies, and Professor Wilson of the Harvard School of Public Health is assisting in a consulting capacity. Three statistical clerks, provided by the Rockefeller Foundation for a period of three years, are making it possible to work up the Clinic data and check the development of tuberculosis in children examined as we go along. The Ten Year Program is providing an unequalled mass of data on tuberculosis in children which, properly used, should add substantially to our knowledge of the subject.

Through the kindness of the Rockefeller Foundation, Dr. J. D. Aronson of Phipps Institute came to us for three weeks in September for a comparative study of the Pirquet and intracutaneous tuberculin tests. With the cooperation of the Follow-up Clinic and Dr. Ransom A. Greene, 1,600 patients in the Fernald School at Waverly were examined, and through the assistance of the Board of Health and the Board of Education of Revere, 3,500 school children in that city were tested. This, we believe, is the most comprehensive study of the subject yet made. The results will be published in the near future.

## SUBSIDY

The subsidy law of 1911 was enacted to encourage cities and counties to build tuberculosis hospitals. As this law seemed to have accomplished its original purpose, the Department of Public Health recommended its repeal to the Legislature of 1930. This recommendation was not approved, and \$278,654.20 in subsidy was paid to cities and towns by the State in the past year.

As the Act provides that refunds shall be made to communities only for bona fide cases of tuberculosis hospitalized in institutions approved by the Department of Public Health, the Department is given a certain power to set minimum standards for the hospital care of the tuberculous. Unquestionably this provision has been of value in securing improvements in local tuberculosis hospitals, but in 1930 it became necessary to withdraw the subsidy from three city hospitals because the local authorities were unwilling to try to meet the very moderate requirements of the Department. With the recent marked improvements in methods of treatment in tuberculosis, it is becoming increasingly difficult for any but the larger cities to maintain tuberculosis hospitals that can be considered at all adequate. We believe the only logical solution of the problem in Massachusetts is the union of towns, and in some instances counties, in the support of sanatoria of such size that they can furnish the type of service to which our citizens are entitled, at a cost within the reach of the communities.

For the year ending November 30, 1930, there have been received 2,572 claims for subsidy from 125 cities and towns. Of this number, 2,249 claims amounting to \$278,654.20 were allowed and paid.

## LAKEVILLE STATE SANATORIUM

## RESIDENT OFFICERS

LEON A. ALLEY, M. D., *Superintendent*.  
 GEORGE L. PARKER, M. D., *Assistant Superintendent*.  
 PETER FERRINI, M.D., *Senior Physician*.  
 ARTHUR KANSERSTEIN, M.D., *Assistant Physician*.  
 RICHARD COOKE, M.D., *Assistant Physician*.  
 EMANUEL KLINE, D.M.D., *Dentist*.  
 CHIN S. CHANG, M.D., *Junior Bacteriologist*.  
 CAROLINE T. WHITE, R.N., *Superintendent of Nurses*.  
 MARY C. O'CONNELL, *Head Teacher*.  
 KATHERINE NUTE, *Head Occupational Therapist*.  
 SUSAN M. MURPHY, *Head Housekeeper*.  
 CHESTER TAYLOR, *Steward*.  
 ROBERT A. KENNEDY, *Chief Power Plant Engineer*.  
 THOMAS FRANCIS MAHONY, *Head Farmer*.



## NON-RESIDENT OFFICERS

FLORENCE S. MONROE, *Principal Bookkeeper and Treasurer.*ZABDIEL B. ADAMS, M.D., *Orthopedic Consultant.*LOUIS A. O. GODDU, M.D., *Orthopedic Consultant.*

## Report of the Superintendent

TO GEORGE H. BIGELOW, M.D., *Commissioner, Department of Public Health:*

I have the honor to submit the twenty-first annual report of the Lakeville State Sanatorium for the year ending November 30, 1930. During the year there has been expended \$263,156.21 for maintenance, a gross weekly per capita cost of \$21.70. There has been collected from miscellaneous sources, (the total of all collections) \$97,257.49. Deducting this amount from the gross maintenance expense, leaves a net expense of \$165,898.72 and a net weekly per capita cost of \$13.68. There has been collected from private sources \$6,494.00, from Cities and Towns \$87,144.50, from the State Board of Retirement \$31.85, and from Sales \$2,530.00.

There were 33 patients supported wholly or in part by private funds, 242 by Cities and Towns, 66 wholly by the State, 2 State Wards, and 40 patients on whom settlement has not been determined.

As authorized by Chapter 127, Acts of 1928 (\$1,500.00 for Water Supply), there was expended prior to 1930, \$901.65; during 1930, \$540.15; total \$1,441.80, reverting to State Treasury \$58.20. This work has been completed. As authorized by Chapter 115, Acts of 1930 (\$6,800.00 New Water Supply), there was expended during 1930, \$6,005.91. This work has been completed. As authorized by Chapter 127, Acts of 1928 (\$45,000.00 Sewage Disposal), there was expended prior to 1930, \$44,940.25; during 1930, \$16.00; total \$44,956.25, reverting to State Treasury \$43.75. As authorized by Chapter 146, Acts of 1929 and Chapter 115, Acts of 1930 (\$17,700.00 Fire Protection), there was expended prior to 1930, \$4,723.67; during 1930, \$8,186.57; total \$12,901.24. Not completed. As authorized by Chapter 127, Acts of 1928 (\$22,000.00 Remodeling South Pavilion), there was expended prior to 1930, \$21,259.40; during 1930, \$661.95; total \$21,921.35, reverting to State Treasury \$78.65. This work has been completed. As authorized by Chapter 127, Acts of 1928 (\$56,800.00 Nurses' Home), there was expended prior to 1930, \$54,880.57; during 1930, \$1,486.84; total \$56,367.41, reverting to State Treasury \$432.59. Work completed. As authorized by Chapter 127, Acts of 1928 (\$15,000.00 Engine Room), there was expended prior to 1930, \$14,979.96, reverting to State Treasury \$20.04. Work completed. As authorized by Chapter 127, Acts of 1928 (\$8,000.00 Steamline), there was expended prior to 1930, \$6,200.00; during 1930, \$695.50; total \$6,895.50, reverting to State Treasury \$1,104.50. Work completed. As authorized by Chapter 146, Acts of 1929 (\$132,500.00 Children's Building), there was expended prior to 1930, \$23,110.83; during 1930, \$109,224.29; total \$132,335.12. Not completed. As authorized by Chapter 115, Acts of 1930 (\$21,000.00 Superintendent's House), there was expended during 1930, \$6,125.26. Not completed. As authorized by Chapter 115, Acts of 1930 (\$13,000.00 Alterations on Administration Building), there was expended during 1930, \$8,296.44. Not completed. As authorized by Chapter 115, Acts of 1930 (\$10,000.00 Furnishings and Equipment on Children's Building), there was expended during 1930, \$9,689.44. Not completed.

There were 218 patients in the Sanatorium at the beginning of the year, December 1, 1929, and 249 patients at the close, November 30, 1930. The largest number present at one time was 261, and the smallest 215. The daily average number of patients was 233.2, 20.5 more than last year. Daily average number of bed patients was 197.3, children 128.2, adults 69.1. There were 165 patients admitted during the year. For the classification of patients admitted, your attention is called to "Table No. 7." The average age of patients admitted was 23 years. Including deaths there were 134 patients discharged, and the average duration of residence was 448 days. Of those discharged 86 patients gained 1,451.5 pounds, an average gain of 16.9 pounds per person. Of those discharged there were 50 arrested, 11 quiescent, 41 improved, 2 unimproved, 19 deaths, 2 not considered (duration of treatment being less than one month), 9 non-tuberculous. There were 85,114 hospital days of treatment, 7,494 hospital days more than for 1929.

## APPOINTMENTS AND RESIGNATIONS

Dr. Samuel Segal resigned from our resident staff April 18, 1930, to take a post-graduate course at the University of Pennsylvania in surgery, prior to entering the practice of surgery in Cincinnati, Ohio. Dr. Arthur Kansersstein, A.B., Harvard 1922, and a graduate of Tufts Medical School 1926, was appointed Assistant Physician April 15, 1930. Dr. Richard Cooke, a graduate of Tufts Medical School 1928, was appointed Assistant Physician July 1, 1930.

## MEDICAL REPORT

The weekly and monthly staff meetings and conferences have been continued the same as in previous years, and have been of distinct value to the staff and patients.

The general policies of treatment by general and local rest and heliotherapy have produced excellent results in the majority of cases, as is shown by the number of patients discharged, arrested, quiescent, and improved. As no patient, regardless of the stage of disease, is denied admission, in many cases the results in those discharged as "improved" have been as gratifying as some of those with earlier lesions discharged as "arrested". The striking improvement in some of the children admitted with extensive lesions and apparently terminal conditions has been a great source of satisfaction to the entire staff.

Twenty-nine more operations were performed during the year than the year before, there being a total of 79 for the past year. In three cases it was necessary to resort to amputation as a life saving measure. All three cases promptly responded to this type of surgery and are well on the road to recovery. The policy of considerable preoperative general sanatorium treatment, as well as that type of postoperative treatment has demonstrated its value throughout the year.

The additional advantage of artificial heliotherapy by means of the Schwartz High Intensity Carbon Arc Lamp, available for use this fall in the new Children's Building, has proven to be a real asset to a large number of patients. The weeks of exposure lost during the fall and winter months delayed recovery in many cases and it is our feeling, at this time, that the length of residence of some patients may now be shortened by use of the Carbon Arc Lamp during the seasons when out-of-door exposures either cannot be given or are of little value. Those patients unable to take any exposures, because of their weakened condition, are now able to receive the benefit of ultra-violet radiation along with the more hardy group.

A total of 599 plaster casts were applied by the staff. This is an increase of 254 over the previous year. This increase again shows the importance now placed upon local rest along with general rest and sanatorium treatment.

The gain in weight of the patients discharged this past year is interesting as well as rather striking, it being 16.9 pounds per person, an increase of 2.4 pounds over the previous year and the largest average gain noted in any previous year. The average duration of residence was 85 days longer than for the year 1929.

Due to the opening of the new Children's Building in July, it was possible to furnish 7,494 more hospital days of treatment than in 1929, and the daily average number of patients increased from 212.7 to 233.2.

The immunization policy against contagious diseases has been continued with all new patients, in addition to which employees were immunized as follows: vaccinations 106, Schick test 94, of which 11 were positive and received T.A.T., typhoid-paratyphoid 82 (exclusive of ex-patient employees). All food handlers have been examined for possible carriers. There were three cases of diphtheria during the year, two employees and one patient. All three made good recoveries.

Since the opening of the new Children's and Admitting Building, all children admitted under 15 years of age are kept in isolation in the admission wards for three weeks. Children under fifteen years of age are not permitted to visit on any of the children's wards during visiting hours. All patients under 15 years are kept on the wards whenever small children accompany visitors, to prevent contact with them about the grounds. While our dairy herd has remained tuberculosis free, we have continued to pasteurize all milk consumed in the Sanatorium. The above precautions against contagious diseases have thus far proven to be quite successful.

The work in the Outpatient Department and X-Ray Department has nearly doubled that of any previous year.

## Operations, Casts, and Consultation Examinations

## Operations

The following operations were performed during the year:

Arthrodesis of shoulder . . . . .	1	Ostectomy . . . . .	8
Arthrodesis of knee . . . . .	2	Rib resection . . . . .	1
Arthrolysis of knee . . . . .	1	Amputations . . . . .	3
Arthrodesis of spine:		Excision of inflammatory tissue . . . . .	1
Hibbs . . . . .	4	Dissection of sinus . . . . .	1
Albee . . . . .	10	Excision of skin scars . . . . .	1
Arthrodesis of hip:		Tonsillectomies and Adenoidectomies . . . . .	25
Hibbs . . . . .	6	Transfusions . . . . .	5
Wilson . . . . .	1	Incision and drainage of fingers . . . . .	5
Arthrodesis of sacro-iliac . . . . .	1	Removal of myxoma from wrist . . . . .	1
Femoral osteotomy . . . . .	1		
Manipulation tenotomy and tendon lengthening . . . . .	1	Total operations . . . . .	79

## Casts

Plaster casts for the year were as follows (types classified):

Forearms, cylinder . . . . .	18	Spica, double including spine with jacket . . . . .	82
Forearms, including wrists . . . . .	5	Spica, double without jacket . . . . .	90
Forearms, with shoulder cap . . . . .	3	Jackets, spine straight . . . . .	186
Toes to knees, boots . . . . .	10	Jackets with shoulder strap . . . . .	20
Toes to groins, cylinder and boot . . . . .	35	Jackets with collars . . . . .	12
Groin to ankle, cylinder . . . . .	33	Jackets with helmet . . . . .	10
Shells, anterior and posterior . . . . .	32		
Spica, single . . . . .	63	Total casts . . . . .	599

## Consultation Examinations

	Positive	Suspicious	Negative	Re-exam.	Total
Sassaquin Sanatorium, New Bedford . . . . .	9	—	—	—	9
Outpatients . . . . .	12	3	48	2	65
Employees . . . . .	1	—	12	—	13
	22	3	60	2	87

## LABORATORY, X-RAY AND PHOTOGRAPHIC REPORT

## Clinical Microscopy

Blood	Hemoglobin determination . . . . .	490
	Red blood cell counts . . . . .	489
	White blood cell counts . . . . .	205
	Differential counts . . . . .	188
	Blood culture . . . . .	10
	Coagulation time . . . . .	14
	Blood grouping . . . . .	7
Sputum . . . . .	Blood sugar . . . . .	2
	{ Positive T. B. . . . .	28
	{ Negative T. B. . . . .	712
Urine analysis . . . . .		3,533
Spinal fluid . . . . .		12
Feces . . . . .		30
Pleural fluid . . . . .		7
Smears for gonorrhea . . . . .		2

## Bacteriological and Serological Tests

Throat cultures	{ Clinical diphtheria . . . . .	3
	{ Diphtheria carriers . . . . .	31
	{ Negative diphtheria . . . . .	608



P. D. 34.		171
Purulent discharges examined for tuberculosis		1,692
Bacteriological cultures		586
Milk — plate counts		4
Occult blood tests		12
Guaiac tests		11
Isolation and cultivation of tubercle bacilli		662
Phenolsulphonphthalein tests		190
Von Pirquet tests	{ Positive	132
	{ Negative	25
Typhoid agglutination tests		105
Wassermann tests	{ Positive	0
	{ Doubtful	1
	{ Negative	157
Kahn tests	{ Positive	0
	{ Negative	1

### *Animal Experimentation*

Inoculations	{ Guinea pig	118
	{ Rabbit	14
Autopsies	{ Positive T. B.	41
	{ Negative T. B.	86

### *Pathology*

Pathological examinations	87
Postmortem examinations	1
Tissue secting (celloidin sections)	112

### *Preparation of Media (each month)*

Glycerine bouillon	15
Glycerine agar potato	4
Glycerine egg medium	6
Petroff's medium	10
Blood agar plate	3
Loeffler's medium	12
Hormone media	5
Total	10,463

### *Proven Tuberculosis*

#### Diagnosis (by guinea pig)

Tuberculous Ankle	2
Tuberculous Chest sinus	1
Tuberculous Ear	1
Tuberculous Ensiform	1
Tuberculous Foot	2
Tuberculous Glands	4
Tuberculous Groin	1
Tuberculous Hip	5
Tuberculous Intestine	2
Tuberculous Knee	1
Tuberculous Kidney	2
Tuberculous Pleura	1
Tuberculous Sacro-iliac	2
Tuberculous Spine	7
Tuberculous Testicle	2
Tuberculous Thigh	1
Tuberculous Wrist	1
Pulmonary tuberculous	5



## Pathological Diagnosis

Histological tuberculosis . . . . .	14
Chronic inflammation . . . . .	9
Adenocarcinoma . . . . .	2
Hodgkin's disease . . . . .	1
Papilloma . . . . .	1
Total . . . . .	68

*X-Rays*

Number of X-Rays taken from December 1, 1929 to November 30, 1930 . 1,211

*Photographs*

Number of photographs taken from December 1, 1929 to November 30, 1930 215

## DENTAL REPORT

*From December 1, 1929 to November 30, 1930*

Examinations . . . . .	205	Radiographs . . . . .	74
Prophylaxis treatments . . . . .	188	Irrigations . . . . .	117
Fillings:		Vincent's infection treatments . . . . .	5
Permanent teeth . . . . .	306	Root canal treatments . . . . .	10
Temporary teeth . . . . .	109	Pulpectomies . . . . .	3
Extractions:		General anesthesia . . . . .	20
Permanent teeth . . . . .	155	Alveolar cystectomy . . . . .	1
Temporary teeth . . . . .	151	Orthodontic treatments . . . . .	4
Treatments . . . . .	439	Novocaine injections . . . . .	134
Restorations:		Total operations . . . . .	1,923
Bridge repair . . . . .	1		
Crowns . . . . .	1		
Visits . . . . .			851
New patients . . . . .			149
Dismissals . . . . .			184

The dental policy of last year was again pursued this year. Further marked improvement has been made this year in regard to maintenance of oral hygiene, as the conditions of the mouths of the majority of the patients have shown. A noticeable decrease in the number of treatments for Vincent's infection resulted. Last year 33 Vincent's infection treatments were administered, whereas this year only 5 treatments were necessary, a decrease of 28 treatments.

An interesting survey was carried out during the past year, among the newly admitted and the discharged patients, to determine the possible difference in the incidence of caries present before and after hospitalization and subsequent dental treatment. The result is explained by the following tabulation:

## Admissions:

Total number of new patients examined . . . . .	122
Total number of teeth present . . . . .	2,692
Total number of teeth carious . . . . .	521
Caries present (average) . . . . .	19.35%

## Discharges:

Total number of discharged patients examined . . . . .	91
Total number of teeth present . . . . .	1,987
Total number of teeth carious . . . . .	114
Caries present (average) . . . . .	5.73%

These figures demonstrate a decrease, therefore, of 13.62% in the incidence of dental caries between the newly admitted patients before hospitalization and the discharged patients after a period of hospitalization.

Data demonstrating percentage of patients presenting dental caries:

Admissions:

Number of patients examined . . . . .	122	
Number of patients without dental caries . . . . .	25	
Number of patients with dental caries . . . . .	97	
Number of patients presenting dental caries . . . . .		79.5%

Discharges:

Number of patients examined . . . . .	91	
Number of patients without dental caries . . . . .	63	
Number of patients with dental caries . . . . .	28	
Number of patients presenting dental caries . . . . .		30.7%

### EDUCATION

The educational activities have been continued throughout the year and the majority of the patients enrolled have made very good progress. Another teacher was added in September. There are fourteen groups receiving instruction, with a total enrollment of 115 pupils. Several reports on children discharged yield the pleasing information that the children have been able to resume their proper grades and maintain their standing without loss of the time coincident with their treatment in this Sanatorium.

The occupational therapy department has continued its activities throughout the year, more attention being given to extension courses and work of a nature to be of value to the individual after discharge from the sanatorium. Three hundred and nine patients received training from this department during 1930.

### FARM

The various farm projects have been satisfactory during the past year. The poultry plant produced an abundant supply of eggs, broilers, chicken, and fowl. The dairy herd showed an increase in the production of milk from 9,900 to 10,973 pounds per cow. The cows being milked but twice daily. The herd continues to be accredited and abortion free.

The swine, kept as a means of garbage disposal, produced 10,000 pounds of pork for use at the sanatorium, in addition to the sale of \$700 worth of young pigs.

The fruit crop was abundant and of very fine quality. The institution was well supplied with all kinds of fresh vegetables during the growing season, and a good supply of roots and potatoes were stored for the use of the sanatorium this winter.

Two acres of land were reclaimed in 1930 to replace land taken from the farm for institution grounds. Present plans call for the reclaiming of two or three acres more during the ensuing year.

### IMPROVEMENTS AND CHANGES

The new Children's and Admitting Building, upon which construction was started in 1929, was completed and dedicated in July of this year. This building was practically filled within a few weeks. The admitting wards, contagious unit, and lamp treatment room in this building serve a definite need and raise the standards of treatment. This building increased the sanatorium's capacity by 73 beds.

Construction of the superintendent's residence began in October and is progressing satisfactorily. This building should be ready for occupancy in February or March, 1931. The completion of this building will permit the finishing of the reconstruction work on the Administration Building and present quarters of the superintendent, thus releasing the present congested condition of the medical staff's quarters.

The kitchen was enlarged last summer and tile and terrazo floors laid throughout the service and dining rooms for both patients and employees. A much needed gas roasting oven was installed in the kitchen which aids considerably in the preparation of meals for the increased population.

Additions to the fire protection system made during the year are as follows: (1) A high pressure fire pump in the power plant, (2) Automatic sprinkler systems completed in Men's Ward, East Children's Ward, and Administration Building, (3) Erection of a 75,000 gallon storage tank, (4) Separation of fire and domestic piping systems, (5) Installation of post indicator valves outside all buildings with sprinkler systems.

## LIBRARY

Through the efficient services of our librarian, the patients have had the pleasure and privilege of enjoying many good books. Quite a number have been obtained from the Division of Public Libraries in foreign languages. Copies of current periodicals have been available throughout the year.

## ENTERTAINMENTS

New electric radios and loud speakers were installed in the wards, resulting in a marked improvement in that form of entertainment. The patients have enjoyed what moving picture shows have been available on the safety films.

## RELIGION

The Catholic, Protestant, and Jewish chaplains have visited the Sanatorium regularly.

## RECOMMENDATIONS

Additional private rooms are sorely needed for certain types of our patients. Many upon admission are only properly classified when they can be so isolated. Additions to the wings on both men's and women's wards would relieve this situation without too much delay and is respectfully recommended.

An infirmary building for the very sick men and women patients, especially the renal and abdominal types, is an outstanding need of the Sanatorium at this time, and our experience the past few years has convinced us that those patients during certain stages of their disease should be treated in that type of building rather than in open wards.

Alterations in the men's ex-patient cottage are recommended in order that additional rooms for employees may be obtained at a relatively small expense.

A small work shop for occupational therapy is needed for the use of ambulatory patients. No such place is now available for this purpose and constitutes a distinct handicap to this activity.

A new laundry building and equipment is urgently recommended.

It is recommended that the changes in the Fire Protection System be completed during the ensuing year.

## ACKNOWLEDGMENTS

The faithful and untiring services of the resident and non-resident employees merits public approval.

I am deeply appreciative of your continued confidence and advice.

Respectfully submitted,

LEON A. ALLEY, M.D.

*Superintendent.*

## VALUATION

*Land*

Grounds, 50 acres	\$9,130 30
Lawns and Buildings, 48 acres.	
Roads, 2 acres.	
Woodland, 10 acres	535 70
Mowing, 34 acres	1,730 37
Tillage, 49 acres	4,311 81
Tillage, 30 acres.	
Garden, 19 acres.	
Orchard, 8 acres	611 65
Pasture, 41 acres.	1,816 41
Waste and Miscellaneous, 17 acres	942 27
Meadow, pasture, and swamp land, 16 acres.	
Coal trestle, 1 acre.	

\$19,078 51

New Sewerage Disposal 45,000 00

\$64,078 51

*Buildings*

Institution Buildings	\$520,149 70
Farm, Stable and Grounds	46,723 00
Miscellaneous	185,830 60

\$746,703 30

Present value of all personal property 15,322 30

\$762,025 60

# Inventory

## GRAND SUMMARY SHEET

### November 30, 1930

## LAKEVILLE STATE SANATORIUM

### REAL ESTATE

Land, 251.61 acres . . . . .	\$24,403 51	
Buildings . . . . .	746,703 30	
Betterments (additions and improvements) . . . . .	46,175 00	
Total, Real Estate . . . . .		\$817,281 81

### PERSONAL PROPERTY UNDISTRIBUTED SUPPLIES

Travel, Transportation, and Office Expenses (total of departmental sheets) . . . . .	\$580 30	
Food (total of departmental sheets) . . . . .	6,528 39	
Clothing and Materials (total of departmental sheets) . . . . .	23 88	
Furnishings and Household Supplies (total of departmental sheets) . . . . .	3,050 67	
Medical and General Care (total of departmental sheets) . . . . .	1,368 06	
Heat, Light, and Power (total of departmental sheets) . . . . .	4,510 62	
Farm (total of departmental sheets) . . . . .	565 95	
Garage, Stable, and Grounds (total of departmental sheets) . . . . .	156 16	
Repairs (total of departmental sheets) . . . . .	2,892 81	
Total . . . . .		\$19,676 84

### PERSONAL PROPERTY DISTRIBUTED SUPPLIES

Travel, Transportation, and Office Expenses (total of departmental sheets) . . . . .	\$2,655 48	
Clothing and Materials (total of departmental sheets) . . . . .	825 75	
Furnishings and Household Supplies (total of departmental sheets) . . . . .	51,419 77	
Medical and General Care (total of departmental sheets) . . . . .	15,462 70	
Heat, Light, and Power (total of departmental sheets) . . . . .	120 20	
Farm (total of departmental sheets) . . . . .	29,472 70	
Garage, Stable, and Grounds (total of department sheets) . . . . .	4,977 43	
Repairs (total of departmental sheets) . . . . .	780 38	
Total . . . . .		\$105,714 41

### GRAND SUMMARY

Real Estate, Total . . . . .		\$817,281 81
Personal Property — Undistributed Supplies, Total . . . . .	\$19,676 84	
Personal Property — Distributed Supplies, Total . . . . .	105,714 41	
		125,391 25
Grand Total . . . . .		\$942,673 06

## Financial Report, Lakeville State Sanatorium, 1930

TO THE DEPARTMENT OF PUBLIC HEALTH:

I respectfully submit the following report of the finances of this Institution for the fiscal year ending November 30, 1930.

### STATEMENT OF EARNINGS

Board of Patients:		
Private . . . . .	\$6,494 00	
Cities and Towns . . . . .	87,144 50	
		\$93,638 50
Personal Services:		
Labor of Employees . . . . .		
Reimbursements from Board of Retirement . . . . .		31 85
Sales:		
Travel, Transportation and Office Expense . . . . .	—	
Food . . . . .	\$217 03	
Clothing and Materials . . . . .	—	
Furnishings and Household Supplies . . . . .	8 10	
Medical and General Care . . . . .	50 00	
Heat, Light, and Power . . . . .	—	
Farm . . . . .	1,873 50	
Garage, Stable, and Grounds . . . . .	92 37	
Repairs, Ordinary . . . . .	33 08	
Repairs and Renewals . . . . .	—	
Arts and Crafts Sales . . . . .	—	
Miscellaneous — Junk . . . . .	21 79	
Total Sales . . . . .		2,295 87
Miscellaneous:		
Interest on Bank Balances . . . . .	\$234 13	
Rents . . . . .	—	
Total Miscellaneous . . . . .		234 13
Total Earnings for the year . . . . .		\$96,200 35



Total cash receipts reverting and transferred to the State Treasurer		\$97,257 49
Accounts Receivable outstanding Dec. 1, 1929	\$26,243 30	
Accounts Receivable outstanding Nov. 30, 1930	25,186 16	
Accounts Receivable decreased		1,057 14

### MAINTENANCE APPROPRIATION

Balance from previous year, brought forward		\$4,077 79
Appropriation, current year	\$268,300 00	268,300 00
Total		\$272,377 79
Expenditures as follows:		
Personal Services	\$150,340 98	
Food	35,986 01	
Medical and General Care	9,604 16	
Farm	17,883 39	
Heat, Light, and Power	14,796 68	
Garage, Stable, and Grounds	2,016 33	
Travel, Transportation, and Office Expenses	2,859 65	
Religious Instruction	1,380 00	
Clothing and Materials	626 80	
Furnishings and Household Supplies	15,927 80	
Repairs, Ordinary	3,931 34	
Repairs and Renewals	7,803 07	
Total Maintenance Expenditures		\$263,156 21
Balance of Maintenance Appropriation, Nov. 30, 1930		9,221 58
Estimated outstanding Liabilities, Nov. 30, 1930		\$1,947 31

### SPECIAL APPROPRIATIONS

Balance December 1, 1929 brought forward		\$118,512 67
Appropriation for current year		59,800 00
Total		\$178,312 67
Expended during the year (see statement below)	\$150,928 35	
Reverting to Treasury of Commonwealth	1,737 73	
(Star balances below that are reverting)		152,666 08
Balance November 30, 1930, carried to next year		\$25,646 59

APPROPRIATION	Act or Resolve	Total Amount Appropriated	Expended during Fiscal Year	Total Expended to Date	Balance at End of Year
New Water Supply	115-1930	\$6,800 00	\$6,005 91	\$6,005 91	\$794 09
Water Supply	127-1928	1,500 00	540 15	1,441 80	58 20*
Sewerage Disposal	127-1928	45,000 00	16 00	44,956 25	43 75*
Addition to Fire Protection	{ 146-1929 115-1930 }	17,700 00	8,186 57	12,901 24	4,798 76
Remodeling South Pavilion	127-1928	22,000 00	661 95	21,921 35	78 65*
Nurses' Home	127-1928	56,800 00	1,486 84	56,367 41	432 59*
Engine Room	127-1928	15,000 00		14,979 96	20 04*
Steamline	127-1928	8,000 00	695 50	6,895 50	1,104 50*
Children's Building	146-1929	132,500 00	109,224 29	132,335 12	164 88
Superintendent's Home	115-1930	21,000 00	6,125 26	6,125 26	14,874 74
Alteration on Administration Building	115-1930	13,000 00	8,296 44	8,296 44	4,703 56
Furnishings and Equipment on Children's Building	115-1930	10,000 00	9,689 44	9,689 44	310 56
		\$349,300 00	\$150,928 35	\$321,915 68	\$27,384 32
Reverting					1,737 73
					\$25,646 59

### POPULATION

	Males	Females	Boys	Girls	Totals
Number received during the year	44	46	40	35	165
Number passing out of the institution during the year	46	33	31	24	134
Number at end of the fiscal year in the institution	48	42	87	72	249
Daily average attendance (number inmates actually present during the year)	51.29	35.52	80.22	66.16	233.19
Average number of employees and officers during the year.	98.20	58.80	-	-	157.00

### EXPENDITURES

Current Expenditures:	
Salaries	\$150,340 98
Food	35,986 01
Medical and General Care	9,604 16
Farm	17,883 39

Heat, Light, and Power . . . . .	14,796 68	
Garage, Stable, and Grounds . . . . .	2,016 33	
Travel, Transportation, and Office Expense . . . . .	2,859 65	
Religious Instruction . . . . .	1,380 00	
Clothing and Materials . . . . .	626 80	
Furnishings and Household Supplies . . . . .	15,927 80	
Repairs, Ordinary . . . . .	3,931 34	
Repairs and Renewals . . . . .	7,803 07	
<b>Total . . . . .</b>		<b>\$263,156 21</b>
<b>Extraordinary Expenses (Permanent Improvements):</b>		
Water Supply (new), Chapter 115, Acts 1930 . . . . .	\$6,005 91	
Water Supply, Chapter 127, Acts 1928 . . . . .	540 15	
Sewage Disposal, Chapter 127, Acts 1928 . . . . .	16 00	
Addition to Fire Protection, Chapter 146, Acts 1929 . . . . .	{ 8,186 57	
Addition to Fire Protection, Chapter 115, Acts 1930 . . . . .		
Remodeling South Pavilion, Chapter 127, Acts 1928 . . . . .	661 95	
Nurses' Home, Chapter 127, Acts 1928 . . . . .	1,486 84	
Steamline, Chapter 127, Acts 1928 . . . . .	695 50	
Children's Building, Chapter 146, Acts 1929 . . . . .	109,224 29	
Superintendent's House, Chapter 115, Acts 1930 . . . . .	6,125 26	
Alterations Administration Building, Chapter 115, Acts 1930 . . . . .	8,296 44	
Furnishings and Equipment, Children's Building, Chapter 115, Acts 1930 . . . . .	9,689 44	
		<b>\$150,928 35</b>
<b>Grand Total . . . . .</b>		<b>\$414,084 56</b>
<b>Summary of Current Expenses:</b>		
Total Expenditures . . . . .	\$414,084 56	
Extraordinary Expenses, Deducted . . . . .	150,928 35	
		<b>\$263,156 21</b>
Deducting amount of sales . . . . .		2,530 00
		<b>\$260,626 21</b>

Dividing this amount by the daily number of patients 233.19, gives a cost for the year of \$1,117.66, equivalent to an average weekly net cost of \$21.49.

### PER CAPITA

During the year the average number of patients has been . . . . .	233 19
Total cost of maintenance . . . . .	\$263,156 21
Equal to a weekly per capita cost of (52 weeks to year) . . . . .	21 70
Total receipts for the year . . . . .	97,257 49
Equal to a weekly per capita of . . . . .	8 02
Total net cost of maintenance for year (total maintenance less total receipts) . . . . .	165,898 72
Net weekly per capita . . . . .	13 68

Respectfully submitted,

FLORENCE S. MONROE,  
*Treasurer.*

### Statistical Tables

TABLE 1. — *Admissions and Discharges*

	ADULTS		CHILDREN		Totals
	Males	Females	Males	Females	
Patients in the Sanatorium Nov. 30, 1929 . . . . .	50	29	78	61	218
Patients admitted Dec. 1, 1929 to Nov. 30, 1930 . . . . .	44	46	40	35	165
Patients discharged Dec. 1, 1929 to Nov. 30, 1930 . . . . .	46	33	31	24	134
Patients remaining in the Sanatorium Nov. 30, 1930 . . . . .	48	42	87	72	249
Daily average number of patients . . . . .	51.3	35.5	80.2	66.2	233.2
Deaths (included in number discharged) . . . . .	9	5	5	—	19

TABLE 2. — *Civil Condition of Patients Admitted*

	ADULTS		CHILDREN		Totals
	Males	Females	Males	Females	
Single . . . . .	21	21	40	35	117
Married . . . . .	19	20	—	—	39
Widowed . . . . .	4	2	—	—	6
Divorced . . . . .	—	3	—	—	3
<b>Total . . . . .</b>	<b>44</b>	<b>46</b>	<b>40</b>	<b>35</b>	<b>165</b>

TABLE 3. — *Age of Patients Admitted*

	ADULTS		CHILDREN		Totals
	Males	Females	Males	Females	
1 to 13 years . . . . .	-	-	28	25	53
14 to 17 years . . . . .	-	-	9	8	17
18 to 20 years . . . . .	-	-	3	2	5
21 to 30 years . . . . .	18	21	-	-	39
31 to 40 years . . . . .	13	14	-	-	27
41 to 50 years . . . . .	8	7	-	-	15
Over 50 years . . . . .	5	4	-	-	9
Total . . . . .	44	46	40	35	165

TABLE 4. — *Nativity and Parentage of Patients Admitted*

	ADULTS						CHILDREN						TOTALS		
	MALES			FEMALES			MALES			FEMALES					
	Patient	Father	Mother	Patient	Father	Mother	Patient	Father	Mother	Patient	Father	Mother	Patient	Father	Mother
United States:															
Massachusetts	19	7	8	23	9	7	35	15	18	31	8	12	108	39	45
Other New Eng. States	1	1	1	5	4	6	3	1	1	-	-	-	9	6	8
Other States	2	3	1	3	3	6	1	2	1	2	2	1	8	10	9
	22	11	10	31	16	19	39	18	20	33	10	13	125	55	62
Other Countries:															
Albania	1	1	-	-	-	-	-	-	-	-	-	-	1	1	-
Belgium	-	-	-	1	1	1	-	-	-	-	1	-	1	2	1
Canada	4	5	7	4	10	7	-	3	5	2	3	2	10	21	21
China	-	-	-	-	1	-	1	1	1	-	-	-	1	2	1
England	-	-	1	1	-	1	-	1	-	-	-	-	1	1	2
Finland	-	-	-	1	1	1	-	-	-	-	1	2	1	2	3
Germany	-	-	-	1	2	2	-	-	-	2	1	-	1	4	3
Greece	1	1	1	1	1	1	-	-	-	-	-	-	2	2	2
Ireland	3	9	7	-	2	2	-	2	4	-	-	1	3	13	14
Italy	7	9	9	1	3	3	-	7	6	-	6	5	8	25	23
Lithuania	1	1	1	-	-	-	-	1	1	-	-	-	1	2	2
Mexico	-	-	-	1	1	1	-	-	-	-	-	-	1	1	1
Newfoundland	1	1	1	-	1	1	-	2	1	-	-	1	1	4	4
Poland	2	3	3	-	1	1	-	2	2	-	4	3	2	10	9
Portugal	1	2	2	1	1	1	-	1	-	-	3	2	2	7	5
Russia	1	1	1	1	1	1	-	1	-	-	2	3	2	5	5
Scotland	-	-	-	1	1	1	-	-	-	-	1	1	1	2	2
Sweden	-	-	-	-	1	1	-	-	-	-	-	-	-	1	1
Syria	-	-	-	1	1	1	-	1	-	-	-	-	1	2	1
Unknown	-	-	1	-	1	1	-	-	-	-	2	1	-	3	3
	44	44	44	46	46	46	40	40	40	35	35	35	165	165	165

TABLE 5. — *Residence of Patients Admitted*

	Adults	Children	Totals		Adults	Children	Totals
Andover . . . . .	1	-	1	Marlboro . . . . .	1	-	1
Arlington . . . . .	-	1	1	Medford . . . . .	1	1	2
Ashburnham . . . . .	-	1	1	Methuen . . . . .	1	-	1
Athol . . . . .	1	1	2	Natick . . . . .	-	1	1
Attleboro . . . . .	-	1	1	Needham . . . . .	-	2	2
Beverly . . . . .	2	-	2	New Bedford . . . . .	3	1	4
Boston . . . . .	40	19	59	Newton . . . . .	2	-	2
Braintree . . . . .	-	1	1	Northampton . . . . .	-	2	2
Bridgewater . . . . .	-	1	1	Palmer . . . . .	-	1	1
Brockton . . . . .	3	1	4	Plymouth . . . . .	-	1	1
Brookline . . . . .	1	-	1	Quincy . . . . .	-	1	1
Cambridge . . . . .	4	2	6	Reading . . . . .	-	2	2
Canton . . . . .	-	1	1	Revere . . . . .	-	1	1
Chelsea . . . . .	2	2	4	Salem . . . . .	2	2	4
Chicopee . . . . .	1	1	2	Somerset . . . . .	-	1	1
Danvers . . . . .	1	-	1	Somerville . . . . .	4	4	8
Fitchburg . . . . .	1	-	1	Springfield . . . . .	1	2	3
Franklin . . . . .	1	-	1	Taunton . . . . .	1	2	3
Haverhill . . . . .	3	1	4	Uxbridge . . . . .	1	-	1
Holliston . . . . .	1	-	1	Walpole . . . . .	-	1	1
Lawrence . . . . .	4	4	8	Waltham . . . . .	-	2	2
Leominster . . . . .	-	1	1	Watertown . . . . .	-	1	1
Lowell . . . . .	-	3	3	Webster . . . . .	1	-	1
Ludlow . . . . .	-	1	1	Westminster . . . . .	-	1	1
Lynn . . . . .	2	-	2	Weymouth . . . . .	-	1	1
Malden . . . . .	2	1	3	Winthrop . . . . .	1	-	1
Mansfield . . . . .	1	-	1	Woburn . . . . .	-	1	1
Marblehead . . . . .	-	1	1				
					90	75	165

TABLE 6. — *Occupations of Patients Admitted*

	ADULTS		CHILDREN		Totals
	Males	Females	Males	Females	
Baker . . . . .	1	—	—	—	1
Barber . . . . .	1	—	—	—	1
Bookkeeper . . . . .	2	1	—	—	3
Bundle girl . . . . .	—	—	—	1	1
Cabinet maker . . . . .	1	—	—	—	1
Carpenter . . . . .	1	—	—	—	1
Cashier . . . . .	—	1	—	—	1
Chauffeur . . . . .	1	—	—	—	1
Child . . . . .	—	—	16	15	31
Clerk, Music store . . . . .	—	1	—	—	1
Office . . . . .	1	4	—	—	5
Pay-roll . . . . .	—	1	—	—	1
Cook . . . . .	2	—	—	—	2
Dressmaker . . . . .	—	1	—	1	2
Drill maker, machine shop . . . . .	1	—	—	—	1
Fish dealer, wholesale . . . . .	1	—	—	—	1
Fruit peddler . . . . .	2	—	—	—	2
Granite cutter . . . . .	1	—	—	—	1
Home, At . . . . .	2	6	—	—	8
Housekeeper . . . . .	—	1	—	—	1
Housemaid . . . . .	—	1	—	—	1
Housewife . . . . .	—	17	—	—	17
Housework . . . . .	—	1	—	—	1
Ice man . . . . .	1	—	—	—	1
Laborer . . . . .	5	—	—	—	5
Librarian . . . . .	—	1	—	—	1
Mill, Comber tender . . . . .	—	1	—	—	1
Dye mixer . . . . .	1	—	—	—	1
Wool cleaner . . . . .	—	—	1	—	1
Burling . . . . .	—	1	—	—	1
Weaver . . . . .	1	—	—	—	1
Nurse, Domestic . . . . .	—	1	—	—	1
Graduate . . . . .	—	1	—	—	1
Porter . . . . .	1	—	—	—	1
Razor packer . . . . .	—	—	—	1	1
Rubber worker . . . . .	3	—	—	—	3
Salesman . . . . .	1	—	—	—	1
Automobile . . . . .	1	—	—	—	1
Clothing . . . . .	1	—	—	—	1
Insurance . . . . .	1	—	—	—	1
Saleswoman, Bakery . . . . .	—	1	—	—	1
Seaman . . . . .	1	—	—	—	1
Seamstress . . . . .	—	1	—	—	1
School . . . . .	—	—	23	17	40
School teacher . . . . .	—	1	—	—	1
Shoe shop . . . . .	5	1	—	—	6
Social worker . . . . .	—	1	—	—	1
Steel worker . . . . .	1	—	—	—	1
Tailor . . . . .	1	—	—	—	1
Taxi driver . . . . .	1	—	—	—	1
Waitress . . . . .	—	1	—	—	1
Watch maker . . . . .	1	—	—	—	1
Watchman . . . . .	1	—	—	—	1
	44	46	40	35	165

Number of Occupations, 53.



TABLE 7. — *Stage of Disease on Admission*

	ADULTS		CHILDREN		Totals	Per-centage
	Males	Females	Males	Females		
<i>One Lesion</i>						
Tb. Adenitis, Cervical . . . . .	2	-	4	1	7	4.2
Tb. Adenitis, Mesenteric . . . . .	-	-	1	3	4	2.4
Tb. Ankle . . . . .	-	-	-	1	1	.6
Tb. Appendicitis . . . . .	-	-	-	1	1	.6
Tb. Chorioretinitis . . . . .	1	-	-	-	1	.6
Tb. Dactylitis . . . . .	-	-	1	-	1	.6
Tb. Femur . . . . .	1	-	-	1	2	1.2
Tb. Foot . . . . .	-	1	-	1	2	1.2
Tb. Hip . . . . .	3	6	8	1	18	10.9
Tb. Knee . . . . .	-	1	4	1	6	3.6
Lupus Vulgaris . . . . .	1	2	1	1	5	3.0
Tb. Nephritis . . . . .	3	3	-	1	7	4.2
Postoperative Nephrectomy Tb. . . . .	1	-	-	-	1	.6
Tracheo-Bronchial Tb. . . . .	-	-	1	-	1	.6
Tb. Peritonitis . . . . .	1	9	-	4	14	8.5
Tb. Pubic Bone . . . . .	1	-	-	-	1	.6
Tb. Sacro-iliac . . . . .	1	1	-	-	2	1.2
Tb. Shoulder . . . . .	-	1	-	-	1	.6
Tb. Spine . . . . .	11	10	7	7	35	21.2
Tb. Tarsus . . . . .	1	-	-	-	1	.6
Tb. Uveitis . . . . .	-	-	-	1	1	.6
	27	34	27	24	112	-
<i>Two Lesions</i>						
Tb. Adenitis, Cervical and Axillary . . . . .	-	-	2	-	2	1.2
Tb. Adenitis, Cervical, Tb. Peritonitis . . . . .	-	1	-	-	1	.6
Tb. Adenitis, Cervical, Pulmonary Tb. . . . .	1	-	-	-	1	.6
Tb. Ankle, Tb. Adenitis, Cervical . . . . .	-	-	-	2	2	1.2
Tb. Ankle, Tb. Knee . . . . .	1	-	-	-	1	.6
Tb. Ankle, Pulmonary Tb. . . . .	-	1	-	-	1	.6
Tb. Elbow, Tb. Dactylitis . . . . .	-	-	1	-	1	.6
Tb. Epididymitis, Tb. Nephritis . . . . .	1	-	-	-	1	.6
Hilum Tb., Tb. Adenitis Cervical . . . . .	-	-	1	-	1	.6
Tb. Hip, Tb. Spine . . . . .	1	-	-	-	1	.6
Tb. Knee, Pulmonary Tb. . . . .	1	-	-	-	1	.6
Lupus Vulgaris, Pulmonary Tb. . . . .	1	-	-	-	1	.6
Tb. 2nd Metatarsal Bone, Pulmonary Tb. . . . .	-	1	-	-	1	.6
Tb. Nephritis, Tb. Spine . . . . .	-	1	-	-	1	.6
Tb. Peritonitis, Tb. Fistulae-in-ano . . . . .	1	-	-	-	1	.6
Tb. Peritonitis, Pulmonary Tb. . . . .	1	1	-	-	2	1.2
Tb. Peritonitis, Tb. Spine . . . . .	-	1	-	-	1	.6
Tb. Pulmonary Abscess, Pulmonary Tb. . . . .	1	-	-	-	1	.6
Pulmonary Tb., Tb. Enteritis . . . . .	-	1	-	-	1	.6
Tb. Sacro-iliac, Tb. Adenitis Cervical . . . . .	-	1	-	-	1	.6
Tb. Spine, Tb. Ankle . . . . .	-	-	1	-	1	.6
Tb. Spine, Tb. Phlyctenular Keratitis . . . . .	-	-	1	-	1	.6
Tb. Spine, Tb. Knee . . . . .	-	1	-	-	1	.6
Tb. Spine, Pulmonary Tb. . . . .	2	1	-	-	3	1.8
Tb. Spine, Tb. Hip . . . . .	-	-	1	-	1	.6
Tb. Tarsus, Tb. Testicle . . . . .	1	-	-	-	1	.6
	12	10	7	2	31	-
<i>Three Lesions</i>						
Tb. Hip, Tb. Ankle, Tb. Dactylitis . . . . .	-	-	1	-	1	.6
Tb. Hip, Tb. Spine, Tb. Sacrum . . . . .	1	-	-	-	1	.6
Tb. Nephritis, Tb. Cystitis, Tb. Nephrectomy Sinus . . . . .	-	-	1	-	1	.6
Pulmonary Tb., Tb. Adenitis Cervical and Axillary . . . . .	1	-	-	-	1	.6
Tb. Spine, Tb. 5th Metatarsal, Tb. Dactylitis . . . . .	-	-	1	-	1	.6
	2	-	3	-	5	-
<i>Four Lesions</i>						
Tb. Adenitis Cervical, Axillary, Mesenteric and Inguinal . . . . .	-	-	1	-	1	.6
Tb. Colitis, Tb. Fistulae-in-ano, Tb. Shoulder, Tb. Peritonitis . . . . .	-	1	-	-	1	.6
	-	1	1	-	2	-
<i>Non-Tuberculous</i>						
Adenitis Cervical . . . . .	-	-	-	5	5	3.0
Chronic Osteomyelitis . . . . .	1	-	-	2	3	1.8
Gastro-intestinal Disease . . . . .	1	-	-	-	1	.6
Nephritis . . . . .	1	-	-	1	2	1.2
Salpingo-oophoritis . . . . .	-	1	-	-	1	.6
Unclassified . . . . .	-	-	2	1	3	1.8
	3	1	2	9	15	-

TABLE 8. — *Condition on Discharge*

	ADULTS		CHILDREN		Totals	Per-centage
	Males	Females	Males	Females		
Arrested . . . . .	9	11	16	14	50	37.3
Quiescent . . . . .	6	2	3	—	11	8.2
Improved . . . . .	20	12	3	6	41	30.6
Unimproved . . . . .	—	1	1	—	2	1.5
Deaths . . . . .	9	5	5	—	19	14.2
Not considered . . . . .	—	—	1	1	2	1.5
Non-Tuberculous . . . . .	2	2	2	3	9	6.7
	46	33	31	24	134	—

TABLE 9. — *Deaths*

DURATION OF DISEASE	ADULTS		CHILDREN		Totals	LENGTH OF RESIDENCE IN SANATORIUM			
						ADULTS		CHILDREN	
	Males	Fe-males	Males	Fe-males		Males	Fe-males	Males	Fe-males
MONTHS									
Less than 1 . . . . .	—	—	—	—	—	—	1	—	—
1 to 2 . . . . .	—	—	1	—	1	1	1	1	—
2 to 3 . . . . .	—	—	—	—	—	—	—	—	—
3 to 4 . . . . .	—	—	—	—	—	1	—	—	—
4 to 5 . . . . .	—	—	—	—	—	—	—	—	—
5 to 6 . . . . .	—	—	—	—	—	1	—	—	—
6 to 7 . . . . .	—	—	—	—	—	—	—	—	—
7 to 8 . . . . .	—	—	—	—	—	—	1	—	—
8 to 9 . . . . .	—	—	—	—	—	—	—	1	—
9 to 10 . . . . .	—	—	—	—	—	—	—	—	—
10 to 12 . . . . .	—	—	—	—	—	—	—	—	—
12 to 14 . . . . .	1	1	—	—	2	1	—	—	—
14 to 18 . . . . .	1	1	—	—	2	3	1	1	—
18 to 24 . . . . .	2	—	—	—	2	1	—	—	—
Over 2 years . . . . .	5	3	4	—	12	1	1	2	—
	9	5	5	—	19	9	5	5	—

TABLE 10. — *Cause of Death*

	ADULTS		CHILDREN		Totals
	Males	Females	Males	Females	
Tb. Adenitis, Cervical, Pulmonary Tb. . . . .	1	—	—	—	1
Tb. Hip . . . . .	—	—	1	—	1
Tb. Hip, Amyloid Disease of the Liver, Erysipelas . . . . .	—	—	1	—	1
Tb. Hip, Tb. Spine . . . . .	1	—	—	—	1
Tb. Knee, Tb. Spine, Tb. Meningitis . . . . .	1	—	—	—	1
Miliary Tb., Chronic Parenchymatous Nephritis . . . . .	—	—	1	—	1
Tb. Peritonitis, Fecal Fistulae, Chronic Myocarditis . . . . .	—	1	—	—	1
Tb. Peritonitis, Tb. Meningitis . . . . .	—	—	1	—	1
Tb. Sacro-iliac . . . . .	1	—	—	—	1
Tb. Sacro-iliac, Pulmonary Tb. . . . .	1	—	—	—	1
Tb. Spine . . . . .	2	1	1	—	4
Tb. Amyloid Degeneration of Liver and Kidneys . . . . .	—	1	—	—	1
Tb. Spine, Tb. Meningitis . . . . .	1	—	—	—	1
Tb. Spine, Tb. Peritonitis, Pulmonary Tb. . . . .	—	1	—	—	1
Tb. Spine, Pulmonary Tb. . . . .	—	1	—	—	1
Tb. Symphysis Pubis . . . . .	1	—	—	—	1
	9	5	5	—	19

NORTH READING STATE SANATORIUM

- CARL C. MACCORISON, M.D., *Sanatorium Superintendent.*
- EARLE C. WILLOUGHBY, M.D., *Assistant Superintendent.*
- GERALD H. CARON, M.D., *Assistant Physician.*
- DOROTHEA F. WHITNEY, M.D., *Assistant Physician.*
- JAMES H. POWERS, D.M.D., *Dentist.*
- ETHEL M. KNIGHT, *Principal Bookkeeper and Treasurer.*
- ELLEN MURRAY, R.N., *Superintendent of Nurses.*
- ELIZABETH HASLETT, *Head Housekeeper.*
- J. ELLIS DOUCETTE, *Sanatorium Steward.*
- DANIEL J. SCOTT, *Chief Power Plant Engineer.*
- EDWARD J. LEARY, *Head Farmer.*

Report of the Superintendent

To GEORGE H. BIGELOW, M.D., *Commissioner, Department of Public Health:*

I have the honor of submitting the twentieth annual report of the North Reading State Sanatorium for the year ending November 30, 1930.

With the opening of the new Admitting and Isolation Building in June of this year, many perplexing problems, which we have had to face since the Sanatorium was turned over to the care of children, appear to have been solved. We are now able to completely segregate the childhood type patient from the open or adult type case; to properly isolate and care for contagious diseases arising in the wards and pavilions, and to care for acute conditions occurring among the children residing in the pavilions.

The new building has made it possible to accommodate 36 more cases of the adult type of tuberculosis, and at present we are able to receive and care for all adult type cases applying for admission. It also provides 14 cribs for infants and 14 cribs for children from one to three years of age.

On March 24, 1930, an attendant on Pavilion B West developed mumps. Although the 40 little girls on the pavilion were exposed, only 3 developed the disease. On June 21st, a case of chicken pox developed in Pavilion B West. Fortunately only 3 more cases developed from this exposure.

On May 31st a light epidemic of German measles broke out and spread quite rapidly throughout the Sanatorium. Forty-seven cases in all were treated. The majority of the cases showed little or no temperature.

Dr. Cooper and her associates of the Department of Mental Diseases have held eleven clinics at the Sanatorium during the year, 43 children attending. The cases referred to this clinic were as follows:—retardation in school, bed-wetting and other untidy habits, neurotic ideas, vicious habits, and behavior problems. These clinics have been of great value to the Sanatorium and I cannot speak too highly of Dr. Cooper's work and cooperation.

Nine eye, ear, nose, and throat clinics were held during the year by Dr. Odoneal and Dr. DeWolf. One hundred and three children were referred to these clinics, 42 were fitted with glasses, and 17 had tonsils and adenoids removed.

CLINICS

The following number of patients were examined in the Outpatient and Consultation Clinics:

	Positive	Negative	Suspicious	Total
Consultation Clinic . . . . .	16	2	66	84
Outpatient Clinic . . . . .	87	6	704	797
Outpatient X-Rays . . . . .	—	—	—	319

DENTAL REPORT

The following table is a summary of the work done during the year:— Prophylactic Treatments, 854; Fillings (Perm. Teeth), 419; Fillings (Temp. Teeth), 217; Extractions (Perm. Teeth), 150; Extractions (Temp. Teeth), 606; Treatments, 772; Restorations, 9; X-Ray, 154; Irrigations, 546; Visits, 2,953; New Patients, 310; Dismissals, 656.

## LABORATORY REPORT

The following examinations were made in our laboratory: — Sputum Examinations: (Positive, 199; Negative, 1,281), 1,480; Urine Analyses, 1,116; White Blood Counts, 73; Red Blood Counts, 20; Differential Counts, 57; Babcock Tests, 17; Bacterial Plate Counts for Milk, 13; Throat Culture, 33; Other Cultures and Smears, 55; Widal Tests, 164.

During the year there has been expended for maintenance \$233,732.25, a gross weekly per capita cost of \$19.88. There has been collected from miscellaneous sources \$66,086.90 (the total of all collections). Deducting this amount from the gross maintenance expenses leaves a net expense of \$167,645.35. The net weekly per capita cost was \$14.26. There has been collected from private funds \$3,423.00; from cities and towns \$61,067.00. Twenty-four cases (including ten from Division of Child Guardianship) were supported by private funds, 340 by cities and towns, and 81 wholly by state.

## MEDICAL REPORT

There were 211 patients at the Sanatorium at the beginning of the year, and 248 at the close. The largest number present at any one time was 259, and the smallest number 185. The daily average number of patients was 226.1. There were 296 cases admitted during the year, 94 more than last year. There were 239 cases admitted from cities and towns of over 25,000 population, and 56 cases from cities and towns under 25,000 population. The average age of patients was 9.7 years. Including deaths there were 259 cases discharged, and the average duration of residence was 12 months. Of those discharged, 214 gained 2,671.5 pounds, — an average gain of 12.5 pounds per person.

Of the discharges, there were 53 apparently well cases, 1 apparently cured, 77 arrested, 40 apparently arrested, 9 quiescent, 23 improved, 21 unimproved, 12 not considered (the duration of treatment being less than thirty days). There were 23 deaths — 15 more than last year, the increase being due to our ability to receive a much larger number of advanced open cases.

There were 82,754 hospital days.

The following table shows the classification on the application blank and our classification on admission:

	Classification on Application Blanks	Our Classification on Admission
Childhood Tuberculosis . . . . .	175	170
Minimal . . . . .	48	28
Moderately Advanced . . . . .	44	18
Advanced . . . . .	13	17
Tuberculosis of Spine . . . . .	0	2
Tuberculosis Cervical Adenitis . . . . .	1	3
Tuberculosis of Hip . . . . .	0	1
Tuberculosis Peritonitis . . . . .	1	1
Bronchiectasis . . . . .	0	1
Chronic Cardiac Valvular Disease . . . . .	0	1
Malnutrition . . . . .	0	21
No Disease . . . . .	0	16
Empyema . . . . .	0	1
Eczema . . . . .	0	1
Hodgkins' Disease . . . . .	0	1
Hydrothorax . . . . .	0	1
Asthma . . . . .	0	1
Actinomycosis . . . . .	0	1
Unclassified . . . . .	10	4
Pleurisy . . . . .	1	0
Incipient . . . . .	1	0
Suspect . . . . .	1	0
Glandular Tuberculosis . . . . .	1	0
Deferred . . . . .	0	



## SCHOOL STATISTICS

*Average Daily Attendance:* — Grade I, 18.2; Grade II, 22.8; Grades III and IV, 36.5; Grades V and VI, 23.2; Grades VII and VIII, 25.8; High School, 21.

*Percentage of Attendance:* — Grade I, 96; Grade II, 95; Grades III and IV, 96; Grades V and VI, 96; Grades VII and VIII, 93; High School, 94.

*Total Membership:* — Grade I, 59; Grade II, 64; Grades III and IV, 130; Grades V and VI, 72; Grades VII and VIII, 100; High School, 56.

Average daily attendance for school, 147.4.

Per cent of attendance for school, 95.

Total enrollment for school, 425.

## IMPROVEMENTS

Two new 185 H.P. boilers, a new feed water heater and filter were installed in the boiler room and numerous minor improvements made. Work was started on the new employees' building and addition to the nurses' hall in October. An addition was made to the patients' dining room, and alterations to the staff dining room. New tile floors were laid in the kitchen, bake shop, serving room, meat room, and corridor. Alterations were made in the power plant to accommodate the wash room of the laundry in the place formerly occupied by the carpenter shop. A new washer and drying tumbler were installed in this wash room. The old wash room of the laundry was made over to accommodate the paint shop, which was moved from the basement of the East cottage.

New food conveyors were installed in the patients, employees', and staff dining rooms.

The old hot and cold water lines in all buildings, with the exception of the schoolhouse and the risers in one or two of the pavilions, were replaced. A new hot water heater was installed in the basement of Pavilion A West to supply Pavilion B West, Pavilion A West, and the schoolhouse.

Another heater was placed in the basement of Pavilion B East to take care of B East and Pavilion C.

A new hot water main was laid from the hot water heater at the power plant to the West Ward to take care of Pavilion A East, East Ward, Administration Building and West Ward.

A new chlorinator was installed at the chlorinating house at the filter beds and a water line was extended from the fire line near the Power House to the chlorinating house.

Seven new two and one-half inch tubular wells were driven, a new domestic pump house built, and a new double action piston pump installed in the house, together with the old pump, which was moved from the old pump house.

A four-inch domestic water line was laid to the farm house. The old 20,000 gallon tank was moved from its former location near Pavilion B West to a point near the power plant to take care of boiler feed water and irrigation.

The riser pipe and frost box of the 25,000 gallon tank were renewed and a heater installed in this tank.

A concrete slab was constructed at the junction of the pipes leading to the 25,000 gallon tank.

The 100,000 gallon tank was scraped and painted on the inside and a telltale installed.

About 200 feet of macadam roadway was built leading from the main drive by the south entrance of the new hospital to the power plant.

## RECOMMENDATIONS

If a cottage is to be built for the Superintendent, I would recommend that the sum of \$3,000 be appropriated for the remodeling and equipping of our present Administration Building to provide better office facilities.

Provision should be made for further alteration and extension of our water supply and for fire protection purposes.

The diet kitchens for the East and West Wards should be enlarged and dish washers and sterilizers installed.

The Administration Building is badly in need of rewiring.

I would suggest that we consider the installation of a motor generator set to provide temporary power for the new hospital building whenever the power from the Reading plant is temporarily suspended. I also recommend that we be permitted to replace the old Shepard engine in the power plant.

Our four ton ice compressor is too small for the present load. I would recommend that we be permitted to replace this with a six-ton motor-driven compressor.

The old cement floor in the patients' dining-room is unsightly. I would recommend that Terazzo floors be installed throughout the patients' dining room.

#### ACKNOWLEDGMENTS

To the Catholic, Protestant, and Jewish clergymen I wish to express my appreciation for their untiring efforts on behalf of our patients; to the Elks of Lowell and our young Scottish friends we are indebted for their frequent visits to the Sanatorium to entertain our little folks. Their shows are the most appreciated events of the year.

We have been very generously remembered with gifts of books, magazines, Christmas presents, etc.

To the heads of the various departments and all other employees, I am deeply grateful for their loyalty and co-operation.

Respectfully submitted,

CARL C. MACCORISON,  
*Superintendent.*

### Inventory GRAND SUMMARY SHEET

November 30, 1930

#### NORTH READING STATE SANATORIUM

##### REAL ESTATE

Land, 101.75 acres . . . . .	\$4,901 30	
Buildings . . . . .	588,712 52	
Betterments (additions and improvements) . . . . .	146,704 46	
Total . . . . .		\$740,318 28

##### PERSONAL PROPERTY UNDISTRIBUTED SUPPLIES

Travel, Transportation, and Office Expenses (total of departmental sheets) . . . . .	\$509 30	
Food (total of departmental sheets) . . . . .	5,267 55	
Clothing and Materials (total of departmental sheets) . . . . .	3,863 30	
Furnishings and Household Supplies (total of departmental sheets) . . . . .	2,980 58	
Medical and General Care (total of departmental sheets) . . . . .	505 08	
Heat, Light, and Power (total of departmental sheets) . . . . .	4,506 05	
Farm (total of departmental sheets) . . . . .	1,199 23	
Garage, Stable, and Grounds (total of departmental sheets) . . . . .	150 45	
Repairs (total of departmental sheets) . . . . .	1,605 46	
Total . . . . .		\$20,587 00

##### PERSONAL PROPERTY DISTRIBUTED SUPPLIES

Travel, Transportation, and Office Expenses (total of departmental sheets) . . . . .	\$4,483 89	
Clothing and Materials (total of departmental sheets) . . . . .	277 28	
Furnishings and Household Supplies (total of departmental sheets) . . . . .	51,876 40	
Medical and General Care (total of departmental sheets) . . . . .	15,739 40	
Heat, Light, and Power (total of departmental sheets) . . . . .	116 16	
Farm (total of departmental sheets) . . . . .	7,652 13	
Garage, Stable, and Grounds (total of departmental sheets) . . . . .	6,531 04	
Repairs (total of departmental sheets) . . . . .	4,270 40	
Total . . . . .		\$90,946 70

##### GRAND SUMMARY

Real Estate, Total . . . . .		\$740,318 28
Personal Property — Undistributed Supplies, Total . . . . .	\$20,587 00	
Personal Property — Distributed Supplies, Total . . . . .	90,946 70	
		111,533 70
Grand Total . . . . .		\$851,851 98

#### Financial Report, North Reading State Sanatorium, 1930

*To the Department of Public Health:*

I respectfully submit the following report of the finances of this institution for the fiscal year ending November 30, 1930.

## STATEMENT OF EARNINGS

Board of Patients:			
Private . . . . .	\$3,423 00		
Cities and Towns . . . . .	61,067 00		
		\$64,490 00	
Personal Services:			
Reimbursement from Board of Retirement . . . . .		77 69	
Sales:			
Food . . . . .	\$62 00		
Clothing and Materials . . . . .	631 57		
Furnishings and Household Supplies . . . . .	36 40		
Medical and General Care . . . . .	201 35		
Farm . . . . .	46 24		
Garage, Stable, and Grounds . . . . .	50 78		
Sundry Sales to Store Room . . . . .	88 41		
Total Sales . . . . .		\$1,116 75	
Miscellaneous:			
Interest on Bank Balances . . . . .	\$400 46		
Fee for an Abstract . . . . .	2 00		
Total Miscellaneous . . . . .		\$402 46	
Total earnings for the year . . . . .			\$66,086 90
Total Cash Receipts Reverting and Transferred to the State Treasurer . . . . .			\$66,911 05
Accounts Receivable Outstanding Dec. 1, 1929 . . . . .	\$18,849 12		
Accounts Receivable Outstanding Nov. 30, 1930 . . . . .	18,024 97		
Accounts Receivable decreased . . . . .			\$824 15

## MAINTENANCE APPROPRIATION

Balance from previous year, brought forward . . . . .		\$490 48
Appropriation, current year . . . . .	\$246,000 00	
		246,000 00
Total . . . . .		\$246,490 48
Expenditures as follows:		
Personal Services . . . . .	\$132,837 81	
Food . . . . .	43,501 11	
Medical and General Care . . . . .	5,446 46	
Farm . . . . .	4,007 32	
Heat, Light, and Power . . . . .	10,962 67	
Garage, Stable, and Grounds . . . . .	1,897 74	
Travel, Transportation, and Office Expenses . . . . .	2,643 86	
Religious Instruction . . . . .	1,600 00	
Clothing and Materials . . . . .	3,296 58	
Furnishings and Household Supplies . . . . .	6,229 77	
Repairs, Ordinary . . . . .	3,605 28	
Repairs and Renewals . . . . .	17,703 65	
Total Maintenance Expenditures . . . . .		\$233,732 25
Balance of Maintenance Appropriation, Nov. 30, 1930 . . . . .		\$12,758 23
Estimated Outstanding Liabilities, Nov. 30, 1930 . . . . .		\$2,990 87

## SPECIAL APPROPRIATIONS

Balance December 1, 1930, brought forward . . . . .		\$139,318 45
Appropriation for current year . . . . .		136,000 00
Total . . . . .		\$275,318 45
Expended during the year (see statement below) . . . . .	\$185,752 58	
Reverting to Treasury of Commonwealth* (star balances below that are reverting) . . . . .	22 00	
		185,774 58
Balance November 30, 1930, carried to next year . . . . .		89,543 87

APPROPRIATION	Act or Resolve	Total Amount Appropriated	Expended during Fiscal Year	Total Expended to Date	Balance at End of Year
Administration and Isolation Bldg.	146-1929	\$172,000 00	\$129,582 50	\$168,432 97	\$3,567 03
Power House Alterations . . . . .	146-1929	40,000 00	20,553 23	35,835 31	4,164 69
	115-1930				
Improving Water Supply and Fire Protection . . . . .	146-1929	37,000 00	12,349 02	30,974 52	6,025 48
	115-1930				
Additional Fire Protection . . . . .	126-1928	9,000 00	-	8,990 05	9 95*
Improving Sewer System . . . . .	126-1928	3,500 00	54 50	3,487 95	12 05*
Addition to Dining Room . . . . .	115-1930	4,000 00	3,986 43	3,986 43	13 57
Addition to Nurses' Home . . . . .	115-1930	20,000 00	5,365 96	5,365 96	14,634 04
Employees' Building . . . . .	115-1930	75,000 00	13,860 94	13,860 94	61,139 06
	-	\$360,500 00	\$185,752 58	\$270,934 13	\$89,565 87

## POPULATION

	Males	Females	Totals
Number received during year . . . . .	146	150	296
Number passing out of Institution during year . . . . .	112	147	259
Number at end of fiscal year in Institution . . . . .	122	126	248
Daily average attendance (number of inmates actually present during year) . . . . .	106.9	119.3	226.2
Average number of employees and officers during year . . . . .	51.5	63.4	114.9

PER CAPITA

During the year the average number of patients has been	226.1
Total cost of maintenance	\$233,732 25
Equal to a weekly per capita cost of (52 weeks to year)	19 88
Total receipts for the year	66,086 90
Equal to a weekly per capita of	5 62
Total net cost of maintenance for year (total maintenance less total receipts )	167,645 35
Net weekly per capita	14 26

Respectfully submitted,  
ETHEL M. KNIGHT,  
Treasurer.

Statistical Tables

TABLE 1. — Admissions and Discharges

	Males	Females	Totals
Patients in Sanatorium Dec. 1, 1929	88	123	211
Patients admitted from Dec. 1, 1929 to Nov. 30, 1930, incl.	146	150	296
Patients discharged from Dec. 1, 1929 to Nov. 30, 1930, incl.	112	147	259
Patients remaining in Sanatorium Nov. 30, 1930	122	126	248
Daily average (number of patients)	106.9	119.3	226.2
Deaths (included in number discharged)	9	14	23

TABLE 2. — Civil Condition of Patients Admitted

	Males	Females	Totals
Single	146	150	296
Total	146	150	296

TABLE 3. — Age of Patients Admitted

	Males	Females	Totals	Percentage
Under 1 year	3	—	3	1.0
1 to 6 years	34	33	67	22.6
7 to 13 years	83	70	153	51.7
14 to 18 years	25	46	71	24.0
Over 18 years	1	1	2	.7
Totals	146	150	296	100.0

Average age of patients, 9.7 years.

TABLE 4. — Nativity and Parentage of Patients Admitted

PLACE OF NATIVITY	MALES.			FEMALES.			TOTALS.		
	Patient.	Father.	Mother.	Patient.	Father.	Mother.	Patient.	Father.	Mother.
United States:									
Massachusetts	133	55	56	127	55	48	260	110	104
Other N. E. States	6	4	6	7	5	7	13	9	13
Other States	4	7	8	8	8	14	12	15	22
Totals	143	66	70	142	68	69	285	134	139
Other Countries:									
Armenia	0	0	0	0	1	1	0	1	1
Australia	0	0	0	0	0	1	0	0	1
Azores	0	1	1	0	2	1	0	3	2
Austria	0	3	1	0	1	1	0	4	2
Canada	2	18	13	4	20	17	6	38	30
China	0	1	0	0	0	0	0	1	0
Cape Verde	0	1	1	0	0	0	0	1	1
England	0	0	1	1	4	1	1	4	2
France	0	0	2	1	1	2	1	1	4
Finland	0	2	2	0	2	2	0	4	4
Germany	0	3	2	0	0	0	0	3	2
Greece	0	2	2	0	2	2	0	4	4
Hungary	0	0	1	0	0	0	0	0	1
Italy	0	18	18	0	19	19	0	37	37
Ireland	1	7	9	1	9	15	2	16	24
Latvia	0	0	0	0	0	2	0	0	2
Lithuania	0	3	3	0	3	3	0	6	6
Newfoundland	0	1	1	0	2	2	0	3	3
Poland	0	9	9	0	6	8	0	15	17
Portugal	0	7	7	0	2	1	0	9	8
Russia	0	1	1	0	3	1	0	4	2
Scotland	0	0	0	0	2	1	0	2	1
Syria	0	1	1	0	0	0	0	1	1
West Indies	0	0	0	1	1	1	1	1	1
Unknown	0	2	1	0	2	0	0	4	1
Total Foreign	3	80	76	8	82	81	11	162	157
Grand Totals	146	146	146	150	150	150	296	296	296



TABLE 5. — *Residence of Patients Admitted*

Amesbury . . . . .	2	Everett . . . . .	5	Natick . . . . .	2	Stoneham . . . . .	1
Arlington . . . . .	6	Fall River . . . . .	2	New Bedford . . . . .	2	Swampscott . . . . .	1
Avon . . . . .	1	Fitchburg . . . . .	1	Newburyport . . . . .	2	Taunton . . . . .	6
Blackstone . . . . .	1	Foxboro . . . . .	3	Newton . . . . .	5	Wakefield . . . . .	4
Boston . . . . .	79	Gloucester . . . . .	1	Norfolk . . . . .	1	Walpole . . . . .	2
Braintree . . . . .	2	Haverhill . . . . .	2	North Wilmington . . . . .	1	Waltham . . . . .	2
Brockton . . . . .	2	Lawrence . . . . .	8	Peabody . . . . .	3	Watertown . . . . .	1
Cambridge . . . . .	28	Lowell . . . . .	13	Quincy . . . . .	27	Wellesley . . . . .	1
Canton . . . . .	1	Lynn . . . . .	10	Reading . . . . .	7	Weymouth . . . . .	3
Chelsea . . . . .	14	Malden . . . . .	4	Revere . . . . .	2	Wilmington . . . . .	2
Concord . . . . .	1	Maynard . . . . .	1	Salem . . . . .	4	Woburn . . . . .	2
Danvers . . . . .	1	Medford . . . . .	7	Saugus . . . . .	2		
Dedham . . . . .	2	Milton . . . . .	1	Somerville . . . . .	15	Total . . . . .	296

TABLE 6. — *Occupations*

	Males	Fe- males	Totals		Males	Fe- males	Totals
Student . . . . .	118	126	244	Stenographer . . . . .	0	1	1
Preschool Children . . . . .	27	20	47	Factory Worker . . . . .	0	3	3
Orderly . . . . .	1	0	1				
				Totals . . . . .	146	150	296

TABLE 7. — *Stage of Disease on Admission*

	Males	Females	Totals	Percentage
Childhood Tuberculosis . . . . .	91	79	170	57.5
Minimal . . . . .	13	15	28	9.5
Moderately Advanced . . . . .	4	14	18	6.1
Advanced . . . . .	7	10	17	5.8
Tuberculosis of Spine . . . . .	2	0	2	.7
Tuberculous Cervical Adenitis . . . . .	3	0	3	1.0
Tuberculosis of Hip . . . . .	1	0	1	.3
Tuberculous Peritonitis . . . . .	1	0	1	.3
Bronchiectasis . . . . .	0	1	1	.3
Chronic Cardiac Valvular Disease . . . . .	1	0	1	.3
Malnutrition . . . . .	7	14	21	7.1
No Disease . . . . .	7	9	16	5.5
Empyema . . . . .	1	0	1	.3
Eczema . . . . .	1	0	1	.3
Hodgkins' Disease . . . . .	1	0	1	.3
Hydrothorax . . . . .	1	0	1	.3
Asthma . . . . .	0	1	1	.3
Actinomycosis . . . . .	0	1	1	.3
Unclassified . . . . .	1	3	4	1.4
Deferred . . . . .	4	3	7	2.4
Total . . . . .	146	150	296	100.0

TABLE 8. — *Condition on Discharge*

	Males	Females	Totals	Percentage
Apparently Well . . . . .	23	30	53	20.5
Apparently Cured . . . . .	1	0	1	.4
Arrested . . . . .	34	43	77	29.7
Apparently Arrested . . . . .	18	22	40	15.4
Quiescent . . . . .	1	8	9	3.5
Improved . . . . .	13	10	23	8.9
Unimproved . . . . .	7	14	21	8.1
Died . . . . .	9	14	23	8.9
Not Considered . . . . .	6	6	12	4.6
Total . . . . .	112	147	259	100.0

TABLE 9. — *Deaths*

DURATION OF DISEASE	Males	Females	Totals	LENGTH OF RESIDENCE AT SANATORIUM		
				Males	Females	Totals
Under 1 month . . . . .	0	0	0	2	2	4
1 to 2 months . . . . .	0	0	0	1	2	3
2 to 3 months . . . . .	0	1	1	1	1	2
3 to 4 months . . . . .	1	0	1	1	3	4
4 to 5 months . . . . .	1	2	3	2	1	3
5 to 6 months . . . . .	0	0	0	0	2	2
6 to 7 months . . . . .	0	1	1	0	0	0
7 to 8 months . . . . .	2	0	2	0	0	0
8 to 9 months . . . . .	0	1	1	0	0	0
9 to 10 months . . . . .	0	1	1	1	0	1
10 to 11 months . . . . .	0	0	0	0	0	0
11 to 12 months . . . . .	0	0	0	0	0	0
12 to 18 months . . . . .	1	1	2	0	2	2
18 to 24 months . . . . .	1	1	2	0	0	0
Over 2 years . . . . .	3	6	9	1	1	2
Total . . . . .	9	14	23	9	14	23

TABLE 10. — *Cause of Death*

	Males	Females	Totals
Tuberculosis of Lungs . . . . .	7	12	19
Tuberculosis of Vertebral Column . . . . .	1	0	1
Tuberculosis of Lungs, Hips and Meninges . . . . .	1	0	1
Tuberculosis of Intestines, Peritoneum and Lungs . . . . .	0	1	1
Actinomycosis of Right Lung and Chest Wall . . . . .	0	1	1
Totals . . . . .	9	14	23

## RUTLAND STATE SANATORIUM

## RESIDENT OFFICERS

ERNEST B. EMERSON, M.D., *Superintendent.*PAUL DUFAULT, M.D., *Assistant Superintendent*ARMAND LAROCHE, M.D., *Senior Physician.*JACOB KAMINSKY, M.D., *Senior Physician.*GABRIEL NADEAU, M.D., *Assistant Physician.*J. PHILIPPE PAQUETTE, M.D., *Assistant Physician.*CHARLES K. MCCARTHY, M.D., *Assistant Physician.*DELYA E. NARDI, *Principal of the School of Nursing.*RENA BLANCH NAUSS, *Assistant Principal of the School of Nursing.*MARY E. BELL, *Dietitian.*OLIN C. BLAISDELL, *Steward.*MARY A. BOYLE, *Treasurer.*HARRY U. WENDELL, *Chief Power and Plant Engineer.*JOSEPH A. CARROLL, *Head Farmer.*CORA A. PHILLIPS, *Head Housekeeper.*

## NON-RESIDENT OFFICERS

FRANK H. WASHBURN, M.D., *Senior Physician.*EDWARD D. CHURCHILL, M.D., *Senior Physician.*G. ARNOLD RICE, M.D., *Senior Physician.*

## Report of the Superintendent

To DR. GEORGE H. BIGELOW, *Commissioner, Department of Public Health:*

I have the honor to submit the thirty-fourth annual report of the Rutland State Sanatorium for the year ending November 30, 1930.

During the year there has been expended \$319,817.34 for maintenance, a gross weekly per capita cost of \$16.92. There has been expended from Special Appropriations authorized by Chapter 127, Acts 1928, Item 596, Women Employees' Building, \$218.43; Item 597, Additional Fire Protection, \$742.28; from Special Appropriations authorized by Chapter 146, Acts 1929, Water Supply and Sprinkler Heads, \$8,276.07; from Special Appropriations authorized by Chapter 115, Acts 1930, Medical and Surgical Building, \$2,937.40; Lightning Protection, \$13.30; Hay Barn, Garage and Equipment, \$21,274.85.

There has been collected from miscellaneous sources (the total of all collections) \$237,240.69, a decrease of 9.57 per cent under the collections of last year. Deducting this amount from the gross maintenance expense leaves a net expense of \$82,-567.65, a net weekly per capita cost of \$4.36. There has been collected from private sources \$16,593.14; from cities and towns \$59,467.50; from Worcester County \$48,062.50; from Middlesex County \$90,777.35; from the Tubercular Hospital District of Chelsea, Revere and Winthrop \$19,887.50.

Thirty-seven cases were supported wholly or in part from private funds; fifty-three cases by cities and towns; twenty-four wholly by the State; one hundred and fifty-eight by Middlesex County; fifty-one by Worcester County; twenty-six by the Tubercular Hospital District of Chelsea, Revere and Winthrop; and one by the Department of Public Welfare, Division of Child Guardianship. There were twelve cases on which settlement had not been determined.

There were 357 patients in the sanatorium at the beginning of the year and 362 at the close. The largest number present at one time was 369 and the smallest 355. The daily average number of patients was 363.47, an increase of 2.39 over last year and the largest on record. There were 277 patients admitted during the year,

56 less than last year: 42 minimal, 88 moderately advanced, 134 far advanced, 2 childhood type, 4 unclassified, 2 lung abscess, 3 tuberculous pleurisy, and 2 bronchiectasis. There were 160 admitted from cities and towns of over 25,000 population and 117 from cities and towns under 25,000 population. The average age of patients admitted was 31.39, an increase of .87. Including deaths there were 272 patients discharged, 68 less than last year. The average duration of residence was 392 days, 46 more than last year. Of those discharged 158 gained 1,983.25 pounds, an average gain of 12.55 pounds per person, the largest gain since 1922 and a steady gain from year to year since 1925. Of the discharged there were 2 arrested cases, 4 less than last year; 12 apparently arrested cases, 1 less than last year; 109 quiescent cases, 15 less than last year; 38 improved; 38 unimproved; 2 no diagnosis; 12 not considered, the duration of treatment being less than one month. There were 3 discharged non-tuberculous. There were 56 deaths, 4 less than last year and the smallest number since 1924. There were 132,669 days of treatment, 874 days more than last year.

The following table shows the classification on the application blank and our classification on admission.

	CLASSIFICATION ON APPLICATION BLANKS		OUR CLASSIFICATION ON ADMISSION		PER CENT	
	1929	1930	1929	1930	1929	1930
Minimal. . . . .	86	57	55	42	16.52	15.2
Moderately Advanced . . . .	182	158	136	88	40.84	31.77
Far Advanced. . . . .	37	41	131	134	39.34	48.37
Unclassified. . . . .	26	20	9	4	2.70	1.45
Childhood Type . . . . .	2	1	2	2	.60	.72
Lung Abscess . . . . .	—	—	—	2	—	.72
Tuberculous Pleurisy . . . .	—	—	—	3	—	1.09
Chronic Bronchiectasis . . .	—	—	—	2	—	.72
	333	277	333	277	—	—

#### LABORATORY REPORT

The following is a report of the work done in the laboratory during the year:

Urine examinations — routine, 440; 24 hour amount, 36; qualitative sugar determination and specific gravity, 2,108; qualitative sugar determination and specific gravity 24 hour amounts, 363; quantitative sugar determinations, 159; acetone and diacetic acid tests, 1,813; diacetic acid (ferric chloride) tests, 192; kidney function tests, 4; Mosenthal's tests, 2; test for bile, 4; Benzidin test for occult blood, 2.

Sputum examinations (for the tubercle bacilli — positive, 2,702, no tubercle bacilli found, 3,552, 6,254; for fungi (by cultures and smears), 6; for asbestosis bodies, 2; for occult blood Benzidin test, 1.

Blood examinations — cultures, 6; red cell counts, 155; white cell counts, 133; differential counts, 74; hemoglobin determinations (Tallquist), 148; hemoglobin determinations (Newcomer), 5; platelet count, 1; coagulation time, 157; sugar determinations (Folin), 154; calcium determinations (Kramer and Tisdall), 317; urea nitrogen, 1; sedimentation tests, 148; Widal reactions, 141.

Feces examinations — occult blood Benzidin test, 3; ova, etc., 4.

Pleural Fluid examinations — cultures, 15; smears, 19.

Spinal Fluid examinations — cultures, 4; smears, 7; cell counts, 7; differential counts, 7; chemical examination, 4.

Guinea pig inoculations and autopsies, 42.

Preparation of autogenous vaccines, 6.

Examination of pus from bronchi — by cultures, 27; by smears, 75.

Differentiation of bacteria — by cultures, 16; by smears, 42.

Cultures for tubercle bacilli — special media and treatment of material (Corper Method), 46.

Examination of milk — bacteria counts, 66; per cent of fat, 27.

Microscopic examination of pork for *Trichinella Spiralis*, 23.

Cultures for further examination for *B. typhosus* — from urine, 44; from feces, 45.

Blood drawn for Wassermann test — negative, 250; positive, 11; doubtful, 2; total, 263.



Spinal fluid drawn for Wassermann test, 1.

Total number of examinations, 13,619.

Lectures in bacteriology to Nurses' Training School, 24.

Of the total number of patients remaining in the sanatorium November 30, 1930, (362), 76.8 per cent have positive sputum, 1.5 per cent reported no sputum, and 21.7 per cent tubercle bacilli not found. Of the total number of patients whose sputum was examined 77.8 per cent were positive.

There were 244 Smallpox vaccinations; 206 Typhoid and Paratyphoid A and B; 1,605 X-Ray plates of chest, and 152 X-Ray plates of teeth.

### DENTAL REPORT

The following is a summary of the dental work done during the year: office visits, 2,692; X-Rays, 152; pyorrhea cases, 52; stomatitis cases, 36; gingivitis cases, 48; Vincent's cases, 9; bridges fitted, 35; plates trimmed, 44; plates fitted, 40; bed cases, 18; plates given, 30; bites for plates, 27; hemorrhages checked, 4; surgical removals, 3; gums lanced, 18; restorations, 55; socket curetted, 2; ankylosis case, 1; trismus case, 1; prophylaxis treatments, 103; fillings, 697; extractions — under novocaine, 300; gum treatments, 34; treatments, 915; post extractions, 284; impressions, 76; plates repaired, 15; mouth washes, 36; gold inlays, 42; abscesses treated, 14; bridges cemented, 5; process removed from upper right molar region, 1; upper partial plate re-adjusted, 10; clasp on upper partial plate, 1; scaling teeth, 22; crowns fitted, 12; tightening clasp on upper partial plate, 23; impacted teeth treated, 6; cyst lanced, 4; antrum cases, 2; extractions in bed, 18; impacted teeth extracted, 10; syphilitic cases, 2; tuberculous stomatitis, 2.

### CLINICS

The following tables indicate the work of the consultation service, clinics, out-patient and others:

*Consultation Clinics.* — Number of patients examined at the Worcester, Gardner, Framingham, Clinton, and Milford Clinics, 190. Diagnosis: Tuberculosis, 26; Non-tuberculous, 48; Observation, 101; Childhood Type, 15.

There were 64 cases examined on which a diagnosis of tuberculosis had previously been made. One hundred and ninety consultation cases reported for 214 examinations, and 37 ex-patients reported for 71 follow-up examinations, making a total of 285 examinations at the consultation clinics.

Number of patients examined once, 172; twice, 16; three times, 1; seven times, 1.

Number of ex-patients examined once, 23; twice, 7; three times, 2; four times, 2; five times, 1; six times, 1; nine times, 1.

Number of physicians referring patients, 67.

There were 7 patients admitted to the sanatorium following examinations at the consultation clinics.

*Sanatorium — Out-patient Clinic.* — Patients referred by physicians, 145; patients examined at own request, 61; total, 206; ex-patients examined at own request, 141. Total examinations, 347.

Diagnosis: Tuberculosis, 76; Non-tuberculous, 71; Observation, 47; Childhood Type, 10; total, 204.

Two hundred and four patients reported for 218 examinations and 143 ex-patients reported for 190 examinations, making a total of 408 examinations at the sanatorium.

Number of patients examined once, 191; twice, 12; three times, 1.

Number of ex-patients examined once, 105; twice, 32; three times, 4; four times, 1; five times, 1.

Number of physicians referring patients to the sanatorium, 95.

There were 12 patients admitted to the sanatorium following examinations at the sanatorium.

There were 2 patients examined at other sanatoria. Diagnosis: Tuberculosis, 1; Tuberculous Hip, 1; total, 2.

The following figures indicate the work of the school clinics which were held in Orange, Warren, Webster, Northborough, Milford and West Boylston: Diagnosis: tuberculosis, 19; non-tuberculous, 315; observation, 155; childhood type, 9; lung abscess, 1; re-examination of patients, 10; total, 509.



The total of all examinations made during the year, exclusive of routine work, was 1,204.

#### PERSONNEL

The traditions of the past are broken by the absence of resignations from the Medical Staff as a result of which there has been an opportunity for more work outside the regular routine.

Dr. Jacob Kaminsky and Mrs. Doris L. Davidson have carried on a series of experiments on "The Oral Administration of Irradiated Ergosterol on the Calcium Concentration of the Blood-serum in Pulmonary Tuberculosis," and this article has been published in the *American Review of Tuberculosis*. They have also made a study of "Calcium Serum Content in Pulmonary Tuberculosis" which was presented at the Trudeau Society and has been accepted for publication by the *American Review of Tuberculosis*.

Dr. Paul Dufault has written a paper on "Oleothonax" which has also been accepted by the *American Review of Tuberculosis* for publication. He has also published in the *Journal of the Outdoor Life* an article on "The Mental Attitude of the Tuberculous Patient."

Dr. Armand Laroche and Dr. Paul Dufault have taken a course for graduates at the Harvard Medical School.

Dr. Jacob Kaminsky was promoted from assistant physician to senior physician and a new position of assistant physician approved June 1, 1930, was filled by the appointment of Dr. Charles K. McCarthy, a graduate of Tufts Medical School.

#### MEDICAL REPORT

The following surgical work has been done either here or in other hospitals: Phrenicectomy, 38; thoracoplasty, 3; artificial pneumo-thorax, 138; oleothorax, 3; apicolysis, 2; general surgical operations, 32.

There have been 56 bronchoscopies and 2 esophagoscopies either for diagnostic purposes or treatment. Eight of these were diagnosed non-tuberculous.

During the year the consultation clinic at Worcester was abandoned and a clinic opened at Milford which has been well attended.

Clinics have also been held in Westboro, Northboro, Webster, Warren, Milford, and West Boylston.

#### TRAINING SCHOOL

The training school is in its twenty-third year. The following were graduated: Dorothy May Alden, Pauline Betz, Julia Marie Murphy, Margaret M. Powers, Juliette R. L'Homme, Muriel L. Frenney, Ruth C. Erickson, Freda L. Coombs, Camille A. Fontaine, Josephine G. Smith.

There are 39 pupil nurses: 11 seniors, 8 intermediates, and 20 juniors.

#### LECTURES

During the year lectures and instruction have been given by the resident staff, George A. Rice, M.D., of the visiting staff, and Helen Hackett, Public Health Consultant.

#### IMPROVEMENTS

Under the special appropriations the sprinkler system has been completed, lightning rods installed, and the hay barn and garage completed.

Work has been started on the medical and surgical building and it is anticipated this building will be ready for occupancy early the coming summer.

The Sanatorium is now producing its milk supply from an accredited tuberculosis free herd of approximately 100 Holsteins.

#### RECOMMENDATIONS

There is not sufficient space for properly handling this number of cattle, and \$25,000 is recommended for the erection of a new cow barn.

A house for the superintendent is recommended at a cost of \$22,000, and \$5,000 is recommended for altering the present superintendent's quarters for the use of other married employees.

For water supply and fire protection to the farm buildings in accordance with the plan of the Division of Engineering, I recommend the appropriation of \$4,700.

The power plant will require extensive alterations in the way of new equipment in the near future or the present policy of making electric current abandoned in favor of purchasing current from the New England Power Association. The smaller of the present engine units has been in service about twenty-four years, the larger one not much less. The peak load is beyond the capacity of the smaller unit and up to that of the larger unit. There are two horizontal return tubular boilers twenty-six years old which are allowed 110 pounds pressure. It is anticipated that this pressure will be reduced probably next year. If the present boilers are used only for heating and for the use of the fire pump, they should have a number of years of usefulness. If the present policy of generating current is continued, new equipment must be installed at an estimated cost of \$13,500. This is exclusive of whatever might be the cost of new boilers.

Studies submitted by Charles T. Main, Inc., Engineers, indicate a sum of \$7,000 necessary to make changes in the electrical equipment if power is to be purchased, and a net annual saving of \$3,000 a year with purchased power.

I would recommend that the present policy of making our current be abandoned and that current be purchased of the New England Power Association provided they can guarantee a 24-hour uninterrupted service, and furthermore that the larger generating unit be held in reserve for emergency use. An appropriation of \$7,000 to make the necessary changes in our equipment, motors, etc., from direct to alternating current is required to carry this plan into effect.

The Engineer's report was not received in time to include in the 1931 Budget.

#### ACKNOWLEDGMENTS

The Reverend Father McNamara, Reverend Father Smith, Reverend Mr. French, and Rabbi Zeldner have ministered to the spiritual needs another year — to them the Sanatorium owes a debt of gratitude for the good they have done.

I wish to acknowledge my gratitude for the loyalty and cooperation of my fellow workers who have made possible whatever has been accomplished.

Again, I am grateful for your counsel and confidence.

Respectfully,

ERNEST B. EMERSON,  
*Superintendent.*

#### VALUATION

##### *Land*

Grounds, 48.797 acres	\$17,517 30
Lawns and buildings, 38.797 acres.	
Roads, 10.00 acres.	
Woodland, 111.52 acres	4,372 20
Mowing, 68.63 acres	6,863 00
Tillage, 32.30 acres	3,145 00
Tillage, 29.69 acres.	
Garden, 2.61 acres.	
Orchard, 6.10 acres	1,220 00
Pasture, 29.34 acres	2,934 00
Waste and Miscellaneous, 68.04 acres	1,524 00
Rough Pasture, 57.21 acres.	
Meadow Swamps, 4.35 acres.	
Sewer Beds, 5.98 acres.	
Coal Trestle, .50 acre.	
Sewerage System	16,277 06
	<hr/> \$53,852 56

##### *Buildings*

Institution Buildings	\$603,006 28
Farm, Stable and Grounds	49,407 31
Miscellaneous	107,941 62
	<hr/> 760,355 21
	<hr/> \$814,207 77
Present value of all personal property as per inventory of November 30, 1930	109,846 58
	<hr/>
Grand Total	\$924,054 35

## Inventory — November 30, 1930

## REAL ESTATE

Land . . . . .	\$53,852 56	
Buildings . . . . .	719,024 96	
Betterments (additions and improvements) . . . . .	41,330 25	
		<u>\$814,207 77</u>

## PERSONAL PROPERTY UNDISTRIBUTED SUPPLIES

Travel, Transportation, and Office Expenses (total of departmental sheets) . . . . .	\$550 41	
Food (total of departmental sheets) . . . . .	6,447 75	
Clothing and Materials (total of departmental sheets) . . . . .	689 34	
Furnishings and Household Supplies (total of departmental sheets) . . . . .	2,086 60	
Medical and General Care (total of departmental sheets) . . . . .	2,253 86	
Heat, Light, and Power (total of departmental sheets) . . . . .	7,244 19	
Farm (total of departmental sheets) . . . . .	7,550 00	
Garage, Stable, and Grounds (total of departmental sheets) . . . . .	73 88	
Repairs (total of departmental sheets) . . . . .	2,980 08	
		<u>\$29,876 11</u>
Total . . . . .		\$29,876 11

## PERSONAL PROPERTY DISTRIBUTED SUPPLIES

Travel, Transportation, and Office Expenses (total of departmental sheets) . . . . .	\$1,596 05	
Clothing and Materials (total of departmental sheets) . . . . .	137 15	
Furnishings and Household Supplies (total of departmental sheets) . . . . .	35,428 95	
Medical and General Care (total of departmental sheets) . . . . .	4,986 96	
Heat, Light, and Power (total of departmental sheets) . . . . .		
Farm (total of departmental sheets) . . . . .	34,389 90	
Garage, Stable, and Grounds (total of departmental sheets) . . . . .	2,489 33	
Repairs (total of departmental sheets) . . . . .	942 13	
		<u>\$79,970 47</u>
Total . . . . .		\$79,970 47

## GRAND SUMMARY

Real Estate — Total . . . . .		\$814,207 77
Personal Property — Undistributed Supplies, Total . . . . .	\$29,876 11	
Personal Property — Distributed Supplies, Total . . . . .	79,970 47	
		<u>109,846 58</u>
Grand Total . . . . .		<u>\$924,054 35</u>

## Financial Report, Rutland State Sanatorium, 1930

*To the Department of Public Health:*

I respectfully submit the following report of the finances of this institution for the fiscal year ending November 30, 1930:

## STATEMENT OF EARNINGS

Board of patients:		
Private . . . . .	\$17,490 00	
Cities and Towns . . . . .	48,751 50	
Middlesex County . . . . .	125,180 00	
Worcester County . . . . .	59,160 00	
Chelsea, Revere, and Winthrop . . . . .	22,239 00	
State Minor Wards . . . . .	94 00	
		<u>\$272,914 50</u>
Personal Services:		
Reimbursement from Board of Retirement . . . . .		153 66
Sales:		
Travel, Transportation, and Office Expenses . . . . .	\$13 28	
Food . . . . .	735 03	
Clothing . . . . .	—	
Furnishings . . . . .	—	
Medical and General Care . . . . .	326 65	
Heat, Light, and Power . . . . .	10 00	
Farm . . . . .	446 69	
Garage, Stable, and Grounds . . . . .	169 83	
Repairs, Ordinary . . . . .	7 50	
Repairs and Renewals . . . . .	—	
		<u>1,708 98</u>
Total sales . . . . .		1,708 98
Miscellaneous:		
Interest on bank balances . . . . .	\$491 75	
Wages unclaimed . . . . .		
Refunds, previous year . . . . .		
		<u>491 75</u>
Total earnings for the year . . . . .		\$275,268 89
Total cash receipts reverting and transferred to the State Treasurer . . . . .		<u>\$237,143 14</u>
Accounts Receivable outstanding Dec. 1, 1929 . . . . .	\$122,808 51	
Accounts Receivable outstanding Nov. 30, 1930 . . . . .	160,934 26	
		<u>\$38,125 75</u>
Accounts Receivable increased . . . . .		

## MAINTENANCE APPROPRIATION

Balance from previous year, brought forward			\$5,303 77
Appropriation, current year	\$338,700 00		
Additional appropriation	1,000 00		
			<u>339,700 00</u>
			\$345,003 77
Expenditures as follows:			
Personal Services	\$171,967 22		
Food	68,130 69		
Medical and General Care	13,288 20		
Farm	15,885 00		
Heat, Light, and Power	17,205 85		
Garage, Stable, and Grounds	3,855 33		
Travel, Transportation, and Office Expenses	3,901 07		
Religious Instruction	1,850 00		
Clothing and Materials	155 23		
Furnishings and Household Supplies	14,309 23		
Repairs, Ordinary	6,068 58		
Repairs and Renewals	3,200 94		
			<u>\$319,817 34</u>
Total Maintenance Expenditures			\$319,817 34
Balance of Maintenance Appropriation, Nov. 30, 1930			\$25,186 43
Estimated outstanding liabilities, Nov. 30, 1930			10,927 40

## SPECIAL APPROPRIATIONS

Balance December 1, 1929, brought forward		\$20,450 58
Appropriations for current year		63,000 00
		<u>\$83,450 58</u>
Total		\$83,450 58
Expended during the year (see statement below)	\$34,621 85	
Reverting to Treasury of the Commonwealth		
(Star balances below that are reverting)	4,553 63	
		<u>39,175 48</u>
Balance November 30, 1930, carried to next year		\$44,275 10

APPROPRIATION	Act or Resolve	Total Amount Ap- propriated	Expended during Fiscal Year	Total Expended to Date	Balance at End of Year
Women Employees' Bldg.	Chap. 127, Acts 1928	\$66,000 00	\$218 43	\$61,746 09	\$4,253 91*
Additional Fire Protection	Chap. 127, Acts 1928	15,000 00	742 28	14,778 10	221 90*
Furnishings, Women Employees' Bldg.	Chap. 146, Acts 1929	8,000 00		7,922 18	77 82*
Water Supply and Sprinkler Heads	Chap. 146, Acts 1929	15,000 00	8,276 07	8,339 83	6,660 17
Medical and Surgical Bldg.	Chap. 115, Acts 1930	35,000 00	4,096 92	4,096 92	30,903 08
Lightning Protection	Chap. 115, Acts 1930	6,000 00	13 30	13 30	5,986 70
Hay, Barn, Garage, etc.	Chap. 115, Acts 1930	22,000 00	21,274 85	21,274 85	725 15
		<u>\$167,000 00</u>	<u>\$34,621 85</u>	<u>\$118,171 27</u>	<u>\$48,828 73</u>

## POPULATION

	Males	Females	Totals
Number received during the year	130	147	277
Number passing out of the institution during the year	133	139	272
Number at the end of fiscal year in the institution	183	179	362
Daily average attendance (number of inmates actually present during the year)	186.5	176.9	363.4
Average number of employees and officers during the year	124.4	77	201.4

## EXPENDITURES

Current expenditures:			
1. Personal Services	\$171,967 22		
2. Clothing	155 23		
3. Subsistence	68,130 69		
4. Ordinary repairs	6,068 58		
5. Office, domestic, and outdoor expenses	70,294 68		
			<u>\$316,616 40</u>
Extraordinary expenses:			
1. Permanent improvements to existing buildings			3,200 94
			<u>\$319,817 34</u>



### Summary of Current Expenses

Total expenditures . . . . .	\$319,817 34
Deducting extraordinary expenses . . . . .	3,200 94
	<hr/>
Deducting amount of sales . . . . .	\$316,616 40
	1,709 74
	<hr/>
	\$314,906 66

Dividing this amount by the daily average number of patients, 363.47 gives a total cost for the year of \$866.38 equivalent to an average weekly net cost of \$16.66.

### PER CAPITA

During the year the average number of patients has been . . . . .	363.47
Total cost of maintenance . . . . .	\$319,817 34
Equal to a weekly per capita cost of (52 weeks to year) . . . . .	16 92
Total receipts for the year . . . . .	237,143 14
Equal to a weekly per capita of . . . . .	12 55
Total net cost of maintenance for year (total maintenance less total receipts) . . . . .	82,674 20
Net weekly per capita . . . . .	4 37

Respectfully submitted,

MARY A. BOYLE,  
Treasurer.

### Statistical Tables

TABLE 1. — *Admissions and Discharges*

	Males	Females	Totals
Patients in Sanatorium Nov. 30, 1929 . . . . .	186	171	357
Patients admitted Dec. 1, 1929, to Nov. 30, 1930, inclusive . . . . .	130	147	277
Patients discharged Dec. 1, 1929, to Nov. 30, 1930, inclusive . . . . .	133	139	272
Patients remaining in Sanatorium Nov. 30, 1930 . . . . .	183	179	362
Daily average number of patients . . . . .	186.5	176.9	363.5
Deaths (included in number discharged) . . . . .	28	28	56

TABLE 2. — *Civil Condition of Patients Admitted*

	Males	Females	Totals
Single . . . . .	57	85	142
Married . . . . .	63	54	117
Widowed . . . . .	6	6	12
Divorced . . . . .	4	2	6
	<hr/>	<hr/>	<hr/>
	130	147	277

TABLE 3. — *Ages of Patients Admitted*

	Males	Females	Totals	Percentage
14 to 20 years . . . . .	11	20	31	11.2
20 to 30 years . . . . .	52	72	124	44.8
30 to 40 years . . . . .	19	32	51	18.4
40 to 50 years . . . . .	22	16	38	13.7
Over 50 years . . . . .	26	7	33	11.9
Average age . . . . .	28.6	34.4	31.4	
	<hr/>	<hr/>	<hr/>	
	130	147	277	

TABLE 4. — *Nativity and Parentage of Patients Admitted*

PLACES OF NATIVITY	MALES			FEMALES			TOTALS		
	Patients	Fathers	Mothers	Patients	Fathers	Mothers	Patients	Fathers	Mothers
United States:									
Massachusetts . . . . .	69	21	17	98	36	34	167	57	51
Other New England States . . . . .	6	12	9	10	11	12	16	23	21
Other States . . . . .	8	5	7	6	8	7	14	13	14
Total Native . . . . .	83	38	33	114	55	53	197	93	86
Other Countries (19)									
Total Foreign . . . . .	47	92	97	33	90	92	80	182	189
Unknown . . . . .	-	-	-	-	2	2	-	2	2
Grand Totals . . . . .	130	130	130	147	147	147	277	277	277

TABLE 5. — *Residence of Patients Admitted*

Amesbury . . . . .	1	Gardner . . . . .	3	Natick . . . . .	1	Sudbury . . . . .	1
Arlington . . . . .	4	Gill . . . . .	1	New Bedford . . . . .	2	Sutton . . . . .	2
Ashland . . . . .	1	Greenwich Village . . . . .	1	Newton . . . . .	7	Tewksbury . . . . .	1
Auburn . . . . .	3	Hartford, Conn. . . . .	1	North Adams . . . . .	1	Townsend . . . . .	1
Barre . . . . .	1	Haverhill . . . . .	1	North Brookfield . . . . .	1	Uxbridge . . . . .	3
Belmont . . . . .	1	Holliston . . . . .	3	Orange . . . . .	1	Wakefield . . . . .	3
Blackstone . . . . .	1	Holyoke . . . . .	5	Oxford . . . . .	1	Waltham . . . . .	9
Boston . . . . .	31	Hudson . . . . .	4	Palmer . . . . .	4	Watertown . . . . .	2
Boylston . . . . .	2	Leominster . . . . .	8	Paxton . . . . .	1	Webster . . . . .	8
Burlington . . . . .	1	Lexington . . . . .	4	Pepperell . . . . .	2	Wilbraham . . . . .	1
Cambridge . . . . .	5	Lowell . . . . .	3	Quincy . . . . .	1	Winchendon . . . . .	2
Charlton City . . . . .	1	Malden . . . . .	12	Reading . . . . .	2	Winchester . . . . .	1
Chelmsford . . . . .	2	Marlboro . . . . .	3	Revere . . . . .	11	Winthrop . . . . .	5
Chelsea . . . . .	9	Medford . . . . .	10	Saundersville . . . . .	1	Woburn . . . . .	1
Chicopee . . . . .	1	Melrose . . . . .	3	Shirley . . . . .	1	Worcester . . . . .	11
Clinton . . . . .	6	Methuen . . . . .	1	Somerville . . . . .	20		
Easton . . . . .	1	Millford . . . . .	4	Southbridge . . . . .	3	Total . . . . .	277
Everett . . . . .	3	Millbury . . . . .	2	Springfield . . . . .	12		
Fall River . . . . .	2	Millis . . . . .	2	Stoneham . . . . .	2		
Framingham . . . . .	3	Mystic, Conn. . . . .	1	Stow . . . . .	1		

TABLE 6. — *Occupation of Cases Admitted*

	Males	Females		Males	Females
Accountant . . . . .	1	—	Machinist . . . . .	6	—
Agent (Field) . . . . .	2	—	Manager (Restaurant) . . . . .	1	—
Agent (Insurance) . . . . .	2	—	Mechanic's Helper . . . . .	1	—
Attendant . . . . .	1	1	Merchant . . . . .	2	—
Baker . . . . .	1	—	Millhand . . . . .	2	1
Barber . . . . .	1	—	Milliner . . . . .	—	2
Bookkeeper . . . . .	1	5	No Occupation . . . . .	1	14
Butcher . . . . .	1	—	Nurse (Graduate) . . . . .	—	3
Calendarman . . . . .	1	—	Nurse (Practical) . . . . .	—	1
Carpenter . . . . .	4	—	Nurse (Student) . . . . .	1	2
Carpenter's Helper . . . . .	1	—	Operator (Comptometer) . . . . .	—	1
Chauffeur . . . . .	2	—	Operator (Telephone) . . . . .	—	5
Checker . . . . .	1	—	Painter . . . . .	4	—
Clerk . . . . .	14	7	Paperhanger . . . . .	1	—
Cobbler . . . . .	1	—	Plasterer . . . . .	1	—
Cook . . . . .	5	—	Postmaster . . . . .	1	—
Counterman . . . . .	1	—	Presser (Clothing) . . . . .	2	—
Decorator . . . . .	1	—	Printer . . . . .	—	1
Estimator (Building) . . . . .	1	—	Professor . . . . .	1	—
Factory . . . . .	13	18	Salesman . . . . .	6	—
Farmer . . . . .	1	—	Saleswoman . . . . .	—	4
Fireman . . . . .	1	—	Seamstress . . . . .	—	2
Fish Cutter . . . . .	1	—	Secretary . . . . .	1	3
Floorman . . . . .	1	—	Shipper . . . . .	1	—
Forester . . . . .	1	—	Spinner . . . . .	—	1
General Work . . . . .	10	—	Stenographer . . . . .	—	7
Grocer . . . . .	1	—	Student . . . . .	5	6
Hostess . . . . .	—	1	Tailor . . . . .	1	—
Housewife . . . . .	—	44	Teacher . . . . .	1	2
Housework . . . . .	—	12	Truckman . . . . .	3	—
Instructor . . . . .	1	—	Upholsterer . . . . .	1	—
Janitor . . . . .	1	—	Waitress . . . . .	—	2
Jeweler . . . . .	1	—	Watchmaker . . . . .	3	—
Laborer . . . . .	4	—	Watchman . . . . .	1	—
Loomfixer . . . . .	1	—	Weaver . . . . .	3	2
Lumber Checker . . . . .	1	—			

Total number of males, 130; total number of females, 147; total, 277. Total number of occupations, 71.

TABLE 7. — *Stage of Disease at Admission*

	Males	Females	Totals	Percentage
Minimal . . . . .	20	22	42	15.2
Moderately Advanced . . . . .	37	51	88	31.8
Far Advanced . . . . .	66	68	134	48.4
Unclassified . . . . .	1	3	4	1.4
Childhood Type . . . . .	1	1	2	.7
Lung Abscess . . . . .	—	2	2	.7
Tuberculous Pleurisy . . . . .	3	—	3	1.1
Chronic Bronchiectasis . . . . .	2	—	2	.7
	130	147	277	—

TABLE 8. — *Condition on Discharge*

	Males	Females	Totals	Percentage
Arrested . . . . .	—	2	2	.7
Apparently Arrested . . . . .	8	4	12	4.4
Quiescent . . . . .	52	57	109	40.1
Improved . . . . .	20	18	38	14.0
Unimproved . . . . .	16	22	38	14.0
Deaths . . . . .	28	28	56	20.6
Non-tuberculous . . . . .	1	2	3	1.1
Not Considered . . . . .	7	5	12	4.4
No Diagnosis . . . . .	1	1	2	.7
	133	139	272	—

TABLE 9. — *Deaths*

DURATION OF DISEASE	Males	Females	Totals	LENGTH OF RESIDENCE AT SANATORIUM		
				Males	Females	Totals
Under 1 month . . . . .	—	—	—	2	1	3
1 to 2 months . . . . .	3	1	4	1	1	2
2 to 3 months . . . . .	1	—	1	2	2	4
3 to 4 months . . . . .	—	—	—	3	5	8
4 to 5 months . . . . .	1	—	1	1	2	3
5 to 6 months . . . . .	—	—	—	1	2	3
6 to 7 months . . . . .	—	—	—	1	1	2
7 to 8 months . . . . .	—	—	—	2	1	3
8 to 9 months . . . . .	—	2	2	1	2	3
9 to 10 months . . . . .	2	—	2	1	—	1
10 to 12 months . . . . .	3	2	5	2	—	2
12 to 18 months . . . . .	3	6	9	6	—	6
18 to 24 months . . . . .	3	4	7	—	2	2
Over 2 years . . . . .	12	13	25	5	9	14
	28	28	56	28	28	56

TABLE 10. — *Cause of Death*

	Males	Females	Totals
Pulmonary Tuberculosis . . . . .	27	26	53
Chronic Interstitial Nephritis and Uremia . . . . .	1	—	1
Pneumonia . . . . .	—	1	1
Acute Nephritis . . . . .	—	1	1
	28	28	56

## WESTFIELD STATE SANATORIUM

## RESIDENT OFFICERS

ROY MORGAN, M.D., *Superintendent.*HEMAN B. CHASE, M.D., *Assistant Superintendent.*ERNEST LANDRY, M.D., *Senior Physician.*BERNARD GOLDBLATT, M.D., *Assistant Physician.*GEORGE E. CROWELL, D.M.D., *Dentist.*BESSIE MACDONALD, *Superintendent of Nurses and Matron.*JOSEPHINE E. FRENCH, *Treasurer.*JOHN E. KINSELLA, *Steward.*BENJAMIN J. SANDIFORD, *Chief Engineer.*WILLIAM G. ATKINSON, *Farmer.*

## NON-RESIDENT OFFICER

M. ARCHIBALD DECHTER, M.D., *Consultant in Diseases of the Eye, Ear, and Throat.*

## Report of the Superintendent

TO DR. GEORGE H. BIGELOW, *Commissioner, Department of Public Health:*

I have the honor to submit the twenty-first annual report of the Westfield State Sanatorium for the year ending November 30, 1930.

We had 289 patients at the beginning of the year and 274 at the close. Our daily average was 281.2. The largest number present was 301, the smallest 252. Total of cases admitted was 210. These were classified as shown in the following table:

No Disease . . . . .	4	Minimal . . . . .	30	Pleurisy with Effusion . . . . .	2
Malnutrition . . . . .	13	Moderately Advanced . . . . .	14	Tuberculous Empyema (Chronic) . . . . .	1
Cervical Adenitis . . . . .	2	Advanced . . . . .	7	Unclassified . . . . .	14
Axillary Adenitis . . . . .	1	Bronchiectasis . . . . .	2		
Hilum Tuberculosis . . . . .	119	Collapse of lobe of lung . . . . .	1		210

## POPULATION

	Males	Females	Totals
Number received during the year . . . . .	112	98	210
Number passing out of the Institution during the year . . . . .	118	107	225
Number at end of the fiscal year in the Institution . . . . .	144	130	274
Daily average attendance (number of inmates actually present during the year) . . . . .	143.2	138	281.2
Average number of employees and officers during the year . . . . .	80	45	125

One hundred and twenty-nine cases were admitted from cities and towns of over 25,000 population; 81 from cities and towns of less than 25,000. The average age of patients was 11.1 years. There were 225 discharges. The average length of stay of patients discharged, including deaths, was 456 days. Of these 13 were Apparently Well; 108 Apparently Arrested; 79 Improved; 11 Unimproved; 6 were not considered as they stayed less than 30 days. There were 8 deaths. Of those discharged, 210 gained 3,005.0 pounds — or an average of 16.0 pounds. There were 102,638 hospital days of treatment.

### COMMENT

Our average number of patients was somewhat lower this year than last. This was due in large part to an epidemic of measles in the spring which interfered with admissions for a time. It is encouraging to note that we now are receiving pulmonary cases in a more favorable stage. Last year we admitted 62 pulmonary cases (22 minimal; 14 moderately advanced; and 26 advanced). This year we admitted 51 pulmonary cases (30 minimal; 14 moderately advanced; and 7 advanced). Last year we had 26 deaths; this year 8 deaths. The credit for this seems to belong to the "Chadwick Clinic" both for the direct finding of early cases and their educational work.

### MEDICAL WORK

Our medical work during the year has been largely routine. We have adhered closely to treatment by prolonged rest. The results continue to be favorable.

Our out-patient work has expanded during the year. This yearly growth is shown in the table below:

1924 . . . . .	241	1928 . . . . .	1,077
1925 . . . . .	396	1929 . . . . .	1,341
1926 . . . . .	441	1930 . . . . .	1,518
1927 . . . . .	743		

Of these 1,518 cases examined during the year, 1,038 were referred by their family physicians; 264 by Boards of Health or other organizations; and only 216 were examined without being referred.

As usual we have worked with the Hampden County Association in the conduct of clinics in the smaller cities and towns. We have also furnished them with medical supervision of their summer camp. All children at the camp were given a tuberculin test and all the reactors were X-Rayed. We have conducted 6 clinics in the County, in which 249 patients were examined and X-Rayed. This county work was somewhat curtailed this year because a fair part of it has been taken over by the "Chadwick Clinic."

Our "outside" work is summarized in the following table:

	Positive	Negative	Sus- picious	Re-exami- nation	Total
1. Examination Clinics . . . . .	8	173	22	46	249
2. Outpatient Clinics . . . . .	187	702	209	420	1,518
	195	875	231	466	1,767

### DENTAL REPORT

The following table shows the work done in the dental clinic during the year: Prophylactic Treatments, 590; Fillings — Permanent Teeth, 774; Fillings — Temporary Teeth, 324; Extractions — Permanent Teeth, 172; Extractions — Temporary Teeth, 172; Treatments, 197; Restorations, 39; X-Ray, 84; Irrigations, 31; Root Canal Fillings, 36; Surgical Removal of Teeth, 9 — Mandibular Cysts, 5 — Maxillary Cysts, 1; Surgical Treatment of Retained Mandibular Abscess, 1. Total, 2,435.

Visits, 1,519; New Patients, 105; Dismissals, 590.



## SANATORIUM SCHOOL

*Average Daily Attendance December, 1929, to December, 1930*

Grade I . . . . .	18.5
Grade II . . . . .	15.8
Grade III . . . . .	15.4
Grade IV . . . . .	17.9
Grade V . . . . .	16.5
Grade VI . . . . .	16.1
Grade VII . . . . .	13.0
Grade VIII . . . . .	15.8
Manual Training . . . . .	20.6

Total Average . . . . .	149.6
-------------------------	-------

Total Enrollment . . . . .	342
----------------------------	-----

We had an epidemic of measles and scarlet fever in May and June — 25 children had measles and there were 4 cases of scarlet fever. All cases were mild — there were no deaths and no serious complications. We also had 13 cases of mumps scattered through the last of the spring and summer.

## IMPROVEMENTS MADE DURING THE YEAR

An eight-room addition to the Farmhouse has been completed, a new school-room has been built for the small children, and the Children's ward has been altered so that we have much better facilities for isolation and treatment of contagious diseases. Minor changes were made in the barn. The new cottage is now under roof and should be completed by spring. A one-room addition to the engineer's cottage has been built and the basement of the big barn has been remodeled for a garage.

## RECOMMENDATIONS

We are still badly in need of additional quarters for employees. An item for this has been placed in our budget and ought to be acted upon favorably.

We ought to have an efficient X-Ray equipment. For the past ten years we have been using an old portable machine. This was partly necessary on account of inadequate space and unreliable current. By early summer we will have adequate quarters for an X-Ray department and also a reliable source of electricity. Since we are now in position to utilize it, a modern outfit should be installed.

## CHANGES

Dr. Bernard Goldblatt was added to our staff on June 1st. In September, Dr. Nettie Pidgeon was transferred to the staff of the "Chadwick Clinic." Her place has not yet been filled on account of our inadequate housing facilities. No other important changes in personnel were made during the year.

## ACKNOWLEDGMENTS

I wish to acknowledge the good work of our chaplains during the year, and to thank our many friends in this vicinity for entertainments, gifts, and other contributions to the welfare of our children. I would also record my appreciation for the loyalty and efficiency of my personnel, which has been very gratifying. I am also deeply indebted to you and other members of the department for your counsel and co-operation during the year.

ROY MORGAN,  
*Superintendent.*

## Inventory — November 30, 1930

*Real Estate*

Land, 263.6 acres . . . . .	\$16,540 00
Buildings . . . . .	341,214 49
Betterments (additions and improvements) . . . . .	31,019 80
Total, Real Estate . . . . .	\$388,774 29

*Personal Property — Undistributed Supplies*

Travel, Transportation, and Office Expenses (total of departmental sheets)	—	
Food (total of departmental sheets)	\$4,809	02
Clothing and Materials (total of departmental sheets)	2,553	53
Furnishings and Household Supplies (total of departmental sheets)	2,500	71
Medical and General Care (total of departmental sheets)	598	68
Heat, Light, and Power (total of departmental sheets)	4,176	58
Farm (total of departmental sheets)	1,039	62
Garage, Stable, and Grounds (total of departmental sheets)	102	65
Repairs (total of departmental sheets)	46	74
Total, Personal Property — Undistributed Supplies	\$15,827	53

*Personal Property — Distributed Supplies*

Travel, Transportation, and Office Expenses (total of departmental sheets)	\$3,169	26
Clothing and Materials (total of departmental sheets)	681	33
Furnishings and Household Supplies (total of departmental sheets)	28,893	21
Medical and General Care (total of departmental sheets)	40,879	55
Heat, Light, and Power (total of departmental sheets)	2,825	89
Farm (total of departmental sheets)	34,634	81
Garage, Stable, and Grounds (total of departmental sheets)	7,048	03
Repairs (total of departmental sheets)	2,693	74
Total, Personal Property — Distributed Supplies	\$120,825	82

*Grand Summary*

Real Estate, Total		\$388,774	29
Personal Property — Undistributed Supplies — Total	\$15,827	53	
Personal Property — Distributed Supplies — Total	120,825	82	
		136,653	35
Grand Total		\$525,427	64

**Financial Report, Westfield State Sanatorium, 1930***To the Department of Public Health:*

I respectfully submit the following report of the finances of this Institution for the fiscal year ending November 30, 1930:

**STATEMENT OF EARNINGS**

Board of patients	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
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**MAINTENANCE APPROPRIATION**

Balance from previous year, brought forward		\$5,781	22
Appropriation, current year	\$269,390	00	
Supplementary Budget	—		
		\$275,171	22
Expenditures as follows:			
Personal Services	\$138,420	31	
Food	43,190	67	
Medical and General Care	8,615	09	
Farm	13,612	90	

Heat, Light, and Power . . . . .	14,713 81
Garage, Stable, and Grounds . . . . .	2,621 34
Travel, Transportation, and Office Expenses . . . . .	3,158 79
Religious Instruction . . . . .	1,234 40
Clothing and Materials . . . . .	3,354 67
Furnishings and Household Supplies . . . . .	8,920 78
Repairs, Ordinary . . . . .	8,598 06
Repairs and Renewals . . . . .	9,199 22
Total Maintenance Expenditures . . . . .	\$255,640 04
Balance of Maintenance Appropriation, Nov. 30, 1930 . . . . .	19,531 18
Estimated outstanding Liabilities, Nov. 30, 1930 . . . . .	\$4,761 46

SPECIAL APPROPRIATIONS

Balance December 1, 1929, brought forward . . . . .	\$26,839 30
Appropriation for current year . . . . .	51,000 00
Total . . . . .	\$77,839 30
Expended during the year (see statement below) . . . . .	\$40,544 08
Reverting to Treasury of Commonwealth (Star balances below that are reverting) . . . . .	*655 54
Balance November 30, 1929, carried to next year . . . . .	\$27,573 10

APPROPRIATION	Act or Resolve	Total Amount Ap- propriated	Expended during Fiscal Year	Total Expended to Date	Balance at End of Year
Swimming Pool* . . . . .	1928	\$4,376 63	—	\$4,376 56	\$0 07
Installing Sprinklers* . . . . .	1928	2,378 25	\$2,369 00	2,369 00	9 25
Sewerage System* . . . . .	1928	827 78	181 56	181 56	646 22
Impr. Water Supply and Fire Pro- tection . . . . .	1929 and 1930	15,734 52	10,881 38	10,881 38	4,853 14
Superintendent's Residence . . . . .	1930	21,000 00	4,308 44	4,308 44	16,691 56
Farm House Alterations . . . . .	1930	9,000 00	8,552 57	8,552 57	447 43
Children's Bldg. Alter. . . . .	1930	11,000 00	9,874 57	9,874 57	1,125 43
Administration Bldg. Alter. . . . .	1930	3,800 00	—	—	3,800 00
Totals . . . . .	—	\$68,117 18	\$36,167 52	\$40,544 08	\$27,573 10

PER CAPITA

During the year the average number of patients has been . . . . .	281.2
Total cost of maintenance . . . . .	\$255,640 04
Equal to a weekly per capita cost of (52 weeks to year) . . . . .	17 48
Total receipts for the year . . . . .	\$82,600 11
Equal to a weekly per capita of . . . . .	6 09
Total net cost of maintenance for year (total maintenance less total receipts) . . . . .	\$171,039 93
Net weekly per capita . . . . .	11 70

Respectfully submitted,  
JOSEPHINE E. FRENCH,  
Treasurer.

Statistical Tables

TABLE 1. — Admissions and Discharges

	Males	Females	Totals
Number of patients admitted Dec. 1, 1929, to Nov. 30, 1930, inclusive . . . . .	112	98	210
Number of patients discharged Dec. 1, 1929, to Nov. 30, 1930, inclusive . . . . .	118	107	225
Number of deaths (including those in previous items) . . . . .	2	6	8
Number in Sanatorium Dec. 1, 1929 . . . . .	150	139	289
Number remaining November 30, 1930 . . . . .	144	130	274

TABLE 2. — Civil Condition of Patients Admitted

	Males	Females	Totals
Single . . . . .	112	98	210
Married . . . . .	0	0	0

TABLE 3. — Ages of Patients Admitted

	Males	Females	Totals
1 to 13 years . . . . .	82	67	149
14 to 20 years . . . . .	30	30	60
20 to 60 years . . . . .	0	1	1
	112	98	210

TABLE 4. — *Places of Nativity*

PLACES OF NATIVITY	MALES			FEMALES			TOTALS		
	Patients	Fathers	Mothers	Patients	Fathers	Mothers	Patients	Fathers	Mothers
United States:									
Massachusetts . . . . .	94	27	33	72	19	25	166	46	58
Other N. E. States . . . . .	9	15	14	8	8	7	17	23	21
Other States . . . . .	4	5	6	14	18	17	18	23	23
Total Natives . . . . .	107	47	53	94	45	49	201	92	102
Other Countries:									
Austria . . . . .	0	0	0	0	1	1	0	1	1
Canada . . . . .	3	12	10	4	7	7	7	19	17
Cape Verdi . . . . .	0	0	0	0	1	0	0	1	1
Denmark . . . . .	0	0	0	0	0	1	0	0	0
England . . . . .	0	1	4	0	1	2	0	4	6
Finland . . . . .	0	0	0	0	4	4	0	2	4
France . . . . .	0	0	0	0	0	1	0	0	1
Great Britain . . . . .	1	1	0	0	0	0	1	1	0
Greece . . . . .	0	1	1	0	0	0	0	1	1
Hungary . . . . .	0	3	3	0	0	0	0	3	3
Ireland . . . . .	0	5	4	0	2	3	0	7	7
Italy . . . . .	1	14	14	0	12	10	1	26	24
Lithuania . . . . .	0	0	0	0	1	1	0	1	1
Newfoundland . . . . .	0	1	0	0	0	0	0	1	0
Norway . . . . .	0	0	0	0	0	1	0	0	1
Poland . . . . .	0	10	9	0	12	10	0	22	19
Portugal . . . . .	0	1	1	0	2	2	0	3	3
Russia . . . . .	0	2	2	0	2	1	0	4	3
Scotland . . . . .	0	4	3	0	0	0	0	4	3
Sweden . . . . .	0	4	4	0	1	0	0	5	4
Syria . . . . .	0	2	2	0	1	1	0	3	3
Turkey . . . . .	0	0	0	0	1	1	0	1	1
	5	61	57	4	48	46	9	109	103
Unknown . . . . .	0	4	2	0	5	3	0	9	5
	5	65	59	4	53	49	9	118	108
	107	47	53	94	45	49	201	92	102
	112	112	112	98	98	98	210	210	210

TABLE 5. — *Residence of Patients Admitted*

Place	Number	Place	Number	Place	Number	Place	Number
Arlington . . . . .	1	Framingham . . . . .	5	Millford . . . . .	3	Springfield . . . . .	25
Attleboro . . . . .	1	Gardner . . . . .	4	Millbury . . . . .	1	State Minor Wards . . . . .	6
Auburn . . . . .	4	Gill . . . . .	2	Newton . . . . .	1	Sutton . . . . .	1
Barre . . . . .	2	Gloucester . . . . .	1	North Adams . . . . .	1	Templeton . . . . .	1
Boston . . . . .	19	Haverhill . . . . .	2	Northbridge . . . . .	1	Tewksbury . . . . .	1
Bourne . . . . .	1	Holden . . . . .	2	Northfield . . . . .	1	Uxbridge . . . . .	1
Cambridge . . . . .	4	Hudson . . . . .	5	Norwood . . . . .	1	Waltham . . . . .	1
Chelsea . . . . .	1	Lancaster . . . . .	3	Palmer . . . . .	1	Watertown . . . . .	1
Chicopee . . . . .	9	Lee . . . . .	1	Pittsfield . . . . .	24	Webster . . . . .	2
Chester . . . . .	1	Lenox . . . . .	1	Quincy . . . . .	10	Westboro . . . . .	1
Clinton . . . . .	2	Lowell . . . . .	1	Randolph . . . . .	3	Weymouth . . . . .	1
Concord . . . . .	1	Malden . . . . .	2	Revere . . . . .	1	Worcester . . . . .	18
Dudley . . . . .	1	Marion . . . . .	1	Rutland . . . . .	5		
Easthampton . . . . .	1	Medfield . . . . .	1	South Deerfield . . . . .	2		210
Fall River . . . . .	1	Medford . . . . .	1	Somerville . . . . .	1		
Fitchburg . . . . .	12	Methuen . . . . .	1	Southwick . . . . .	1		

TABLE 6. — *Occupation of Cases Admitted*

	Males	Females	Totals
At Home . . . . .	8	4	12
Attendant . . . . .	—	1	1
Caddy . . . . .	1	—	1
Clerk . . . . .	1	2	3
Messenger . . . . .	1	—	1
Usher . . . . .	1	—	1
Waiter . . . . .	1	—	1
Factory . . . . .	—	2	2
School . . . . .	99	89	188
	112	98	210



TABLE 7. — *Stage of Disease on Admission*

	Males	Females	Totals	Percentage
No Disease . . . . .	1	3	4	1.9
Malnutrition . . . . .	6	7	13	6.2
Adenitis — axillary, 1; cervical, 2 . . . . .	0	3	3	1.4
Hilum Tuberculosis . . . . .	67	52	119	56.7
Minimal . . . . .	13	17	30	14.3
Moderately Advanced . . . . .	9	5	14	6.7
Advanced . . . . .	4	3	7	3.3
Bronchiectasis . . . . .	1	1	2	.9
Pleurisy with Effusion . . . . .	1	1	2	.9
Tuberculous Empyema (Chronic) . . . . .	0	1	1	.5
Unclassified . . . . .	9	5	14	6.7
Collapse of Lobe of Lung . . . . .	1	—	1	.5
	112	98	210	100.0

TABLE 8. — *Condition on Discharge*

	Males	Females	Totals	Percentage
Apparently Well . . . . .	5	8	13	5.8
Apparently Arrested . . . . .	66	42	108	35.1
Improved . . . . .	37	42	79	48.0
Unimproved . . . . .	4	7	11	2.7
Not considered . . . . .	4	2	6	4.9
Died . . . . .	2	6	8	3.5
	118	107	225	100.0%

TABLE 9. — *Deaths*

DURATION OF DISEASE	Males	Females	Totals	LENGTH OF RESIDENCE AT SANATORIUM		
				Males	Females	Totals
Under 6 months . . . . .	—	—	—	—	—	—
6 to 7 months . . . . .	—	—	—	—	2	2
7 to 8 months . . . . .	—	—	—	1	1	2
8 to 9 months . . . . .	—	—	—	—	—	—
9 to 10 months . . . . .	—	—	—	—	—	—
10 to 12 months . . . . .	1	2	3	1	—	1
12 to 13 months . . . . .	1	—	1	—	—	—
13 to 18 months . . . . .	—	—	—	—	—	—
18 to 24 months . . . . .	—	—	—	—	1	1
Over 2 years . . . . .	—	4	4	—	2	2
	2	6	8	2	6	8

TABLE 10. — *Causes of Death*

CAUSE	Males	Females	Totals
Pulmonary Tuberculosis . . . . .	2	6	8
	2	6	8

## PONDVILLE HOSPITAL

## RESIDENT OFFICERS

GEORGE M. SULLIVAN, M.D., *Superintendent.*VALMORE A. PELLETIER, M.D., *Assistant Superintendent.*HOOSIG H. SERUNIAN, M.D., *Senior Physician.*JAMES SHANNON, M.D., *Assistant Physician.*WILLIAM CARSON, M.D., *Assistant Physician.*VERONICA M. BEAUREGARD, R.N., *Principal of Nursing School.*MARION MACKENZIE, *Principal Bookkeeper and Treasurer.*NEIL FOUNTAIN, *Head Social Service Worker.*MARJORIE RITCHIE, *Laboratory Technician.*MAY E. DONOVAN, *Head Housekeeper.*ERNEST L. GAGE, *Chief Power Plant Engineer.*DANIEL DONOVAN, *Groundskeeper.*

## NON-RESIDENT OFFICERS

ERNEST M. DALAND, M.D., *Chief of Visiting Staff (Surgeon)*.  
 GRANTLEY W. TAYLOR, M.D., *Senior Physician (Assistant Surgeon)*.  
 HORATIO ROGERS, M.D., *Senior Physician (Assistant Surgeon)*.  
 RICHARD DRESSER, M.D., *Senior Physician (Roentgenologist)*.  
 CHARLES E. DUMAS, M.D., *Senior Physician (Assistant Roentgenologist)*.  
 SHIELDS WARREN, M.D., *Senior Physician (Pathologist)*.  
 RALPH L. IRWIN, M.D., *Senior Physician (Assistant Pathologist)*.  
 CARL H. ERNLUND, M.D., *Senior Physician (Laryngologist)*.  
 HENRY JACKSON, JR., M.D., *Senior Physician (Internist)*.  
 ARTHUR M. GREENWOOD, M.D., *Senior Physician (Dermatologist)*.  
 ROGER C. GRAVES, M.D., *Senior Physician (Urologist)*.  
 JOE VINCENT MEIGS, M.D., *Senior Physician (Gynecologist)*.  
 JOHN S. HODGSON, M.D., *Senior Physician (Neurological Surgeon)*.  
 RICHARD H. NORTON, D.M.S., *Senior Physician (Oral Surgeon)*.  
 HUGO B. C. RIEMER, M.D., *Senior Physician (Ophthalmologist)*.  
 EMANUEL KLINE, D.M.D., *(Dentist)*.  
 JAMES C. HUDSON, M.S., *(Physicist)*.

To DR. GEORGE H. BIGELOW, *Commissioner, Department of Public Health*:

I have the honor to submit the fourth annual report of the Pondville Hospital (Norfolk), P. O. Wrentham, Massachusetts, for the year ending November 30, 1930.

During the year, for maintenance there was expended \$211,650.96, representing a gross weekly per capita cost of \$40.57. There were collected from miscellaneous sources \$48,799.86. (Total of all collections.) Of this sum, \$20,254.95 came from private sources; \$27,769.00 came from cities and towns; \$45.39 came from the State Board of Retirement; \$250.00 electricity furnished Prison Colony; and from sales \$480.52.

Deducting the above total collections from the maintenance expenses leaves a net expense of \$162,851.10, equivalent to a net weekly cost per capita of \$31.21.

Four hundred and six patients were supported by private funds, 189 by cities and towns, 48 by the State, leaving 85 settlements pending.

From special appropriations, funds have been expended as follows:

For hospital unit and outpatient department, authorized by Acts of 1929, Chapter 146, and Acts of 1930, Chapter 115, (\$110,500.00) \$82,689.01.

For automatic sprinklers, authorized by Acts of 1929, Chapter 146, (\$2,500.00) \$2,481.00.

For re-conditioning cold storage, authorized by Acts of 1928, Chapter 127, (\$2,800.00) \$250.00.

For additional fire protection, authorized by Acts of 1928, Chapter 127, 1929, Chapter 146, and 1930, Chapter 115, (\$14,500.00), \$1,424.72.

For Recreation Building, authorized by Acts of 1930, Chapter 115 (\$6,000.00) \$1,960.89.

For care of radium, authorized by Acts of 1930, Chapter 115, (\$10,000.00) \$8,051.80.

On November 30, 1929, 77 patients remained in the hospital. During the year there were 806 admissions. Of these 155 represented readmissions. Patients were received from 131 cities and towns; patients were also received from 8 other state institutions. One hundred and ten patients remained in the hospital at the end of the year.

Discharges during the year number 773. The condition of 158 was the same; 353 were improved; 31 unimproved; and 231 died. There were 98 autopsies.

The average stay in the hospital was 47.75 days per patient. The smallest number in the hospital on any one day was 79; the largest number 119. The average number of patients per day was 100.33.

The weekly clinic at the hospital was continued through the year with 51 clinics held. Visits to the regular Thursday clinic numbered 1,376, with an average attendance of 26.98. Patients making their first visit to the clinic numbered 546. Out-patient visits other than the regular Thursday clinic numbered 809. Of these 47 were new patients. Total clinic patients 2,185.

One hundred and sixty-eight clinic patients subsequently entered the hospital.

*X-Ray and Radium.* — Diagnostic X-Ray plates taken, 2,791; fluoroscopic examinations, 253; X-Ray treatments given, 3,309; radium treatments given, 499.

*Operations* — There have been 432 operations. In addition there were 5 esophagoscopies; 30 cystoscopies; 11 proctoscopies; and 2 bronchoscopies.

*Anesthesias.* — An anesthetic was given 548 times.

### DENTAL REPORT

Prophylaxis, 35; Fillings — Permanent Teeth, 4; Extractions — Permanent Teeth, 433; Treatments, 190; Restorations, 6; X-Rays, 62; Irrigations, 77; Examinations, 421; total, 1,228. Total number of visits, 702; total number of new patients, 405; total number of dismissals, 152.

*Changes in Personnel.* — During the year additions and changes were made as follows:

*Visiting Staff:* Hugo B. C. Riemer, M.D., was appointed Ophthalmologist. Charles E. Dumas, M.D., was appointed Assistant Roentgenologist. Ralph L. Irwin, M.D., Assistant Pathologist, succeeded William Lewis, M.D., resigned.

*Resident Staff:* David A. Grendon, M.D., appointed Assistant Physician. Jacob I. Abrams, M.D., Assistant Physician, succeeded Alfonso A. Palermo, resigned. David A. Grendon, M.D., promoted to Senior Physician to succeed Charles E. Dumas, resigned. H. H. Serunian, M.D., Assistant Physician, succeeded David A. Grendon, M.D., promoted. James Shannon, M.D., Assistant Physician, succeeded Jacob I. Abrams, M.D., resigned. H. H. Serunian, M.D., promoted to Senior Physician to succeed David A. Grendon, M.D., resigned. William R. Carson, M.D., Assistant Physician, succeeded H. H. Serunian, M.D., promoted. Marjorie Ritchie, Laboratory Technician, succeeded Anne D. McLaughlin, resigned.

*Course for Nursing Attendants:* Five nursing attendants were graduated during the year. The school is now run to full capacity.

### COMMENTS

Increasing activity has characterized both the outpatient and house services during the past year. Even with the addition of beds in the new wing, the house has been filled to capacity. The new outpatient department is functioning and facilitates that work greatly. All new patients coming to the outpatient department are now receiving a complete physical examination, with the object of giving the patient better diagnostic and therapeutic service.

The surgery has been expanded to meet the increasing demands made upon it.

The department of radiotherapy has been able to meet the increased number of X-Ray treatments necessary with the new water-cooled deep therapy machine which cuts down the time of each treatment and permits the treatment of two patients at the same time. The new platinum-iridium needles of radium element in small quantities has permitted more highly filtered radium therapy. In addition, the steel Lee needles have been converted into platinum-iridium and at present we have eight 10 mgm. platinum-iridium needles.

The laboratory work has increased with the number of patients. Increased laboratory space and equipment is permitting a more careful study of blood in cases receiving deep therapy and in cases of extensive bone metastases and lymphoblastoma.

The addition of a resident to the house staff has permitted the division of the house work into two house services. This has increased the efficiency of the resident work and allowed for greater attention to details of treatment and completion of records.

A consulting ophthalmologist has been added to our visiting staff.

### IMPROVEMENTS

During the year, the new addition was completed, increasing the bed capacity by twenty-five. However, a waiting list has continued throughout the year.

A new brick chimney was built at the power plant and is now being used.

A tennis court for the employees was built opposite the service building.

The laundry was remodeled into a recreation building and is now ready for the installation of moving pictures.

The upstairs floor of the Administration Building is now being used for the laboratory, medical library, and dental room.

The operating unit was enlarged to two operating rooms.

Much grading has been done around the buildings and the underbrush is being cut in the nearby woods.

#### ACKNOWLEDGMENTS

It is a pleasure to acknowledge the work of the chaplains, Rev. Melville Shafer and Rev. Father Maguire, also the Social Service Committee, and the cooperation of officers and employees of the hospital.

For your cooperation and counsel, I am deeply grateful.

Respectfully submitted,

GEORGE M. SULLIVAN,  
*Superintendent.*

#### VALUATION

Land	1929	Improvement	1930
Grounds, 15.7 acres . . . . .	\$1,865 03	\$132 94	\$1,997 97
Lawns and buildings, 14.2 acres, Roads, 1.5 acres.			
Woodland, 292.1 acres . . . . .	14,260 00		14,260 00
Orchard, 1.0 acres . . . . .	230 00		230 00
Waste and Miscellaneous, 15.4 acres . . . . .	150 00		150 00
Rough pasture, 10.0 acres. Meadow swamp, 5.0 acres. Sewer beds, 0.1 acres. Coal trestle, 0.3 acres.			
Sewerage System . . . . .	6,457 88		\$16,637 97
Water System . . . . .	10,900 00	16 34	6,457 88
Fire Protection . . . . .	12,763 20	3,905 72	10,916 34
			16,668 92
			\$50,681 11

#### Buildings

Institution Buildings . . . . .			\$408,601 97
Improvements 1930 . . . . .			4,849 67
Additions 1930 . . . . .			63,293 94
Farmhouse . . . . .			2,500 00
			\$529,926 69
Present value of all personal property November 30, 1930			
Distributed Supplies . . . . .	\$105,962 71		
Undistributed Supplies . . . . .	37,342 47		
			143,305 18
Radium in vault of emanation plant . . . . .			\$673,231 87
			69,880 30
			\$743,112 17

#### Inventory — November 30, 1930

##### Real Estate

Land, 324.2 acres . . . . .	\$16,637 97	
Buildings . . . . .	441,203 05	
Betterments (additions and improvements) . . . . .	72,065 67	
Total, Real Estate . . . . .		\$529,906 69

##### Personal Property — Undistributed Supplies

Travel, Transportation, and Office Expenses (total of Departmental Sheets)	\$1,255 44	
Food (total of Departmental Sheets)	3,322 57	
Clothing and Materials (total of Departmental Sheets)	576 09	
Furnishings and Household Supplies (total of Departmental Sheets)	3,829 63	
Medical and General Care (total of Departmental Sheets)	15,514 53	
Heat, Light, and Power (total of Departmental Sheets)	5,299 95	
Farm (total of Departmental Sheets)		
Garage, Stable, and Grounds (total of Departmental Sheets)	148 57	
Repairs (total of Departmental Sheets)	7,395 69	
Total . . . . .		\$37,342 47



*Personal Property — Distributed Supplies*

Travel, Transportation, and Office Expenses (total of Departmental Sheets)	\$3,236	24
Clothing and Materials (total of Departmental Sheets)	1,739	33
Furnishings and Household Supplies (total of Departmental Sheets)	49,275	91
Medical and General Care (total of Departmental Sheets)	40,460	43
Heat, Light, and Power (total of Departmental Sheets)	—	—
Farm (total of Departmental Sheets)	—	—
Garage, Stable, and Grounds (total of Departmental Sheets)	7,543	52
Repairs (total of Departmental Sheets)	3,707	28
Total	\$105,962	71

*Grand Summary*

Real Estate — Total		\$529,906	69
Personal Property — Undistributed Supplies, Total	\$37,342	47	
Personal Property — Distributed Supplies, Total	105,962	71	
Grand Total		143,305	18
Radium (in vault of emanation plant)		\$673,211	87
Grand Total		69,880	30
Grand Total		\$743,092	17

## POPULATION

	Males	Females	Total
Number admitted during the year	378	428	806
Number discharged during the year	365	408	773
Number remaining in hospital at end of fiscal year	61	49	110
Daily average attendance	54.3	46.0	100.3
Daily average number of officers and employees	41.6	61.1	102.7

## EXPENDITURES

Current Expenditures:		
Salaries and Wages	\$106,799	86
Clothing	813	17
Subsistence	69,457	15
Ordinary	8,070	43
Office, Domestic, Outdoor Expenses	26,510	35
Extraordinary Expenditures:		
Permanent Improvements		
Hospital Unit and Outpatient Department	\$82,689	01
Automatic Sprinklers	2,481	00
Reconditioning Cold Storage	250	00
Additional Fire Protection	1,424	72
Recreation Building	1,960	89
Care and Distribution of Radium	8,051	80
	96,857	42
	\$308,508	38

*Summary of Current Expenses*

Total Expenditures	\$308,508	38
Extraordinary Expenses Deducted	96,857	42
	<hr/>	
Deducting Amount of Sales		\$211,650 96
		753 54
		<hr/>
		\$210,897 42

Dividing this amount by the daily number of patients, 100.3, gives a net cost for the year of \$2,102.67, equivalent to an average weekly net cost of \$40.44.

## Statistical Tables

TABLE I. — *Admissions and Discharges*

	Males	Females	Totals
Patients in hospital December 1, 1929	48	29	77
Patients admitted from December 1, 1929, to November 30, 1930, inclusive	378	428	806
Patients discharged from December 1, 1929, to November 30, 1930, inclusive	365	408	773
Patients remaining in hospital November 30, 1930	61	49	110
Daily average number of patients	54.3	46.0	100.3
Deaths (included in number discharged)	133	98	231

TABLE II. — *Readmissions*

	Males	Females	Totals
Total patients treated . . . . .	426	457	883
Less old patients readmitted first time since December 1, 1929 . . . . .	27	43	70
Less other readmissions . . . . .	70	85	155
Less patients in hospital December 1, 1929 . . . . .	48	29	77
Number new patients admitted from December 1, 1929, to November 30, 1930 . . . . .	281	300	581
Total number different patients treated December 1, 1929, to November 30, 1930 . . . . .	356	372	728

TABLE III. — *Civil Condition of Patients Admitted*

	Males	Females	Totals
Single . . . . .	61	46	107
Married . . . . .	157	161	318
Widowed . . . . .	53	82	135
Divorced . . . . .	5	3	8
Separated . . . . .	5	7	12
Not known . . . . .	—	1	1
Totals . . . . .	281	300	581

TABLE IV. — *Age of Patients Admitted*

	Males	Females	Totals
Under 20 years . . . . .	5	4	9
20 to 29 years . . . . .	5	5	10
30 to 39 years . . . . .	16	37	53
40 to 49 years . . . . .	25	73	98
50 to 59 years . . . . .	75	79	154
60 to 69 years . . . . .	73	63	136
70 to 79 years . . . . .	71	29	100
80 to 89 years . . . . .	10	9	19
90 to 99 years . . . . .	1	1	2
Totals . . . . .	281	300	581

TABLE V. — *Nativity of Patients Admitted*

	Males	Females	Totals		Males	Females	Totals
United States . . . . .	127	167	294	Lithuania . . . . .	6	6	12
Armenia . . . . .	1	1	2	Newfoundland . . . . .	—	1	1
Austria . . . . .	1	1	2	Norway . . . . .	1	—	1
Belgium . . . . .	0	1	1	Poland . . . . .	6	5	11
Canada . . . . .	37	37	74	Portugal . . . . .	5	2	7
China . . . . .	1	—	1	Roumania . . . . .	—	1	1
Czecho-Slovakia . . . . .	1	—	1	Russia . . . . .	5	6	11
Denmark . . . . .	1	—	1	Scotland . . . . .	5	4	9
England . . . . .	18	25	43	Spain . . . . .	1	—	1
Finland . . . . .	5	—	5	Sweden . . . . .	4	3	7
France . . . . .	4	8	12	Syria . . . . .	—	3	3
Germany . . . . .	3	5	8	Turkey . . . . .	1	—	1
Greece . . . . .	4	—	4	Unknown . . . . .	—	1	1
Hungary . . . . .	—	1	1		—	—	—
Ireland . . . . .	35	14	49	Totals . . . . .	281	300	581
Italy . . . . .	9	8	17				

TABLE VI. — *Residence of Patients Admitted*

Abington . . . . .	2	Fitchburg . . . . .	18	Millbury . . . . .	1	Somerville . . . . .	3
Adams . . . . .	1	Foxboro . . . . .	12	Millville . . . . .	1	Southbridge . . . . .	1
Agawam . . . . .	2	Framingham . . . . .	1	Montague . . . . .	3	Southwick . . . . .	1
Amesbury . . . . .	2	Franklin . . . . .	8	Monterey . . . . .	1	Springfield . . . . .	9
Andover . . . . .	1	Freetown . . . . .	2	Natick . . . . .	1	Stoughton . . . . .	1
Arlington . . . . .	2	Gardner . . . . .	6	Needham . . . . .	2	Sturbridge . . . . .	1
Ashburnham . . . . .	1	Gloucester . . . . .	3	New Bedford . . . . .	13	Sudbury . . . . .	1
Athol . . . . .	11	Grafton . . . . .	2	Newburyport . . . . .	2	Sutton . . . . .	1
Attleboro . . . . .	19	Haverhill . . . . .	4	Newton . . . . .	1	Swansea . . . . .	1
Ayer . . . . .	1	Holliston . . . . .	1	North Adams . . . . .	2	Taunton . . . . .	11
Barnstable . . . . .	1	Holyoke . . . . .	4	North Andover . . . . .	1	Tewksbury . . . . .	1
Bellingham . . . . .	1	Hopkinton . . . . .	1	N. Attleboro . . . . .	11	Truro . . . . .	1
Bernardston . . . . .	1	Lawrence . . . . .	15	N. Brookfield . . . . .	1	Upton . . . . .	1
Beverly . . . . .	1	Lee . . . . .	1	Norton . . . . .	7	Uxbridge . . . . .	1
Boston . . . . .	102	Leicester . . . . .	1	Norwood . . . . .	6	Wakefield . . . . .	3
Bridgewater . . . . .	3	Lenox . . . . .	1	Orange . . . . .	4	Walpole . . . . .	2
Brockton . . . . .	14	Leominster . . . . .	7	Orleans . . . . .	2	Watertown . . . . .	2
Brookline . . . . .	2	Lincoln . . . . .	1	Oxford . . . . .	1	Webster . . . . .	1
Cambridge . . . . .	7	Lowell . . . . .	11	Palmer . . . . .	1	Westboro . . . . .	1
Canton . . . . .	2	Ludlow . . . . .	1	Pittsfield . . . . .	9	W. Bridgewater . . . . .	1
Charlton . . . . .	2	Lynn . . . . .	19	Plainville . . . . .	1	W. Springfield . . . . .	2
Chelmsford . . . . .	1	Malden . . . . .	1	Plymouth . . . . .	3	Westfield . . . . .	2
Chelsea . . . . .	5	Manchester . . . . .	1	Quincy . . . . .	6	Westport . . . . .	1
Chicopee . . . . .	3	Mansfield . . . . .	4	Raynham . . . . .	3	Whitman . . . . .	3
Concord . . . . .	1	Marblehead . . . . .	3	Reading . . . . .	2	Winchendon . . . . .	1
Dartmouth . . . . .	1	Marlboro . . . . .	1	Revere . . . . .	1	Winchester . . . . .	2
Dedham . . . . .	8	Maynard . . . . .	3	Rochester . . . . .	1	Woburn . . . . .	2
E. Bridgewater . . . . .	1	Medford . . . . .	3	Rockland . . . . .	3	Worcester . . . . .	17
Easton . . . . .	1	Medway . . . . .	2	Russell . . . . .	1	Wrentham . . . . .	3
Edgartown . . . . .	1	Metuen . . . . .	4	Salem . . . . .	4	E. Jaffrey, N. H. . . . .	1
Everett . . . . .	2	Middleboro . . . . .	7	Sharon . . . . .	4	Manchester, Conn. . . . .	1
Fairhaven . . . . .	1	Middlefield . . . . .	1	Shirley . . . . .	1	State Institutions . . . . .	22
Fall River . . . . .	22	Milford . . . . .	5	Shrewsbury . . . . .	1		

TABLE VII. — *Occupation of Patients Admitted*

	Males	Fe- males	Totals		Males	Fe- males	Totals
Agent . . . . .	1	—	1	Leather sorter . . . . .	—	1	1
Antique furniture finisher . . . . .	1	—	1	Leather worker . . . . .	3	—	3
Assistant restaurant keeper . . . . .	1	—	1	Library clerk . . . . .	1	—	1
Automobile body maker . . . . .	1	—	1	Longshoreman . . . . .	1	—	1
Automobile mechanic . . . . .	2	—	2	Loom fixer . . . . .	2	—	2
Baker . . . . .	2	—	2	Lumber yard man . . . . .	1	—	1
Barber . . . . .	1	—	1	Machinist . . . . .	6	—	6
Barrel maker . . . . .	1	—	1	Maid . . . . .	—	1	1
Blacksmith . . . . .	4	—	4	Manager . . . . .	1	—	1
Boarding house keeper . . . . .	—	2	2	Maritime fireman . . . . .	1	—	1
Bookbinder . . . . .	—	1	1	Mason . . . . .	1	—	1
Bookkeeper . . . . .	—	2	2	Matron . . . . .	—	1	1
Box maker . . . . .	—	1	1	Melter . . . . .	1	—	1
Brass moulder . . . . .	1	—	1	Merchant . . . . .	1	—	1
Brass polisher . . . . .	1	—	1	Mill worker . . . . .	10	3	13
Brick mason . . . . .	1	—	1	Milliner . . . . .	—	2	2
Brick mason helper . . . . .	1	—	1	Moulder . . . . .	1	—	1
Butcher . . . . .	1	—	1	Night watchman . . . . .	1	—	1
Cabinet maker . . . . .	2	—	2	None . . . . .	9	27	36
Candy wrapper . . . . .	—	1	1	Nurse . . . . .	1	1	2
Car shifter . . . . .	1	—	1	Nursemaid . . . . .	—	1	1
Caretaker . . . . .	1	—	1	Oilier, R. R. . . . .	1	—	1
Carpenter . . . . .	12	—	12	Packer, china ware . . . . .	1	—	1
Carpet finisher . . . . .	1	—	1	Painter . . . . .	10	—	10
Carriage painter . . . . .	1	—	1	Paper cutter . . . . .	1	—	1
Chair maker . . . . .	1	—	1	Paper finisher . . . . .	1	—	1
Chair shop worker . . . . .	—	1	1	Photographer . . . . .	2	—	2
Chambermaid . . . . .	—	1	1	Physician . . . . .	1	—	1
Chauffeur . . . . .	3	—	3	Picker (Mill) . . . . .	1	—	1
Chef . . . . .	1	—	1	Pipe fitter . . . . .	1	—	1
Chiropodist . . . . .	1	—	1	Polisher (jewelry shop) . . . . .	1	—	1
Choreman . . . . .	1	—	1	Porter . . . . .	1	—	1
Cleaner (silk mill) . . . . .	1	—	1	Poultry trader . . . . .	1	—	1
Clerical work . . . . .	1	1	2	Practical nurse . . . . .	—	2	2
Clerk . . . . .	1	—	1	Proprietress rooming house . . . . .	—	1	1
Cloth finisher . . . . .	1	—	1	Printer . . . . .	3	—	3
Cloth inspector . . . . .	—	1	1	Prison officer . . . . .	1	—	1
Cobbler . . . . .	1	—	1	Pupil . . . . .	2	2	4
Companion . . . . .	—	1	1	Radio worker . . . . .	1	—	1
Confectioner . . . . .	1	—	1	Rag sorter . . . . .	1	—	1
Cook . . . . .	2	2	4	Receiving clerk . . . . .	1	—	1
Dairy man . . . . .	1	—	1	Rubber worker . . . . .	1	—	1
Day worker . . . . .	—	2	2	Rural mail carrier . . . . .	1	—	1
Dish washer . . . . .	1	—	1	Saleslady . . . . .	—	1	1
Draughtsman . . . . .	1	—	1	Salesman . . . . .	5	—	5
Dressmaker . . . . .	—	2	2	Salvation Army officer . . . . .	—	1	1
Drop forger . . . . .	1	—	1	Seamstress . . . . .	—	2	2
Druggist . . . . .	1	—	1	Sheet metal worker . . . . .	1	—	1
Electrical worker . . . . .	—	1	1	Shipper (paper house) . . . . .	1	—	1
Electrician . . . . .	2	—	2	Shipping clerk . . . . .	1	—	1
Enamel charger . . . . .	—	1	1	Shirt maker . . . . .	—	1	1
Engineer . . . . .	1	—	1	Shoe maker . . . . .	3	—	3
Fabric worker . . . . .	1	—	1	Shoe worker . . . . .	4	1	5
Farmer . . . . .	13	—	13	Silk twister . . . . .	1	—	1
Fireman . . . . .	1	—	1	Slasher tender . . . . .	1	—	1
Fish dealer . . . . .	1	—	1	Stationery fireman . . . . .	1	—	1
Fisherman . . . . .	2	—	2	Statuary moulder . . . . .	1	—	1
Foreman . . . . .	1	—	1	Steam fitter . . . . .	2	—	2
Fruit peddler . . . . .	1	—	1	Stitcher . . . . .	—	1	1
Fur trapper . . . . .	1	—	1	Stock clerk . . . . .	1	—	1
Furnace moulder . . . . .	1	—	1	Stock keeper . . . . .	1	—	1
Gardener . . . . .	6	—	6	Store keeper . . . . .	1	—	1
Glass setter . . . . .	1	—	1	Straw worker . . . . .	—	1	1
Glazier . . . . .	1	—	1	Street car operator . . . . .	1	—	1
Grocer . . . . .	2	—	2	Street sweeper . . . . .	1	—	1
Hack driver . . . . .	1	—	1	Superintendent (shoe fac- tory) . . . . .	1	—	1
Hat maker . . . . .	—	1	1	Tailor . . . . .	2	—	2
Herdsmen . . . . .	1	—	1	Tanner . . . . .	1	—	1
Hostler . . . . .	1	—	1	Teamster . . . . .	7	—	7
Hotel clerk . . . . .	1	—	1	Textile worker . . . . .	1	—	1
Housekeeper . . . . .	—	21	21	Title examiner . . . . .	—	1	1
Housewife . . . . .	—	189	189	Tool maker . . . . .	1	—	1
Housework . . . . .	—	10	10	Trackman . . . . .	1	—	1
Ice cream maker . . . . .	1	—	1	Truckman . . . . .	1	—	1
Inspector . . . . .	1	1	2	Vaudeville entertainer . . . . .	1	—	1
Inventor . . . . .	1	—	1	Waiter . . . . .	1	—	1
Iron worker . . . . .	3	—	3	Waitress . . . . .	—	1	1
Janitor . . . . .	5	—	5	Weaver . . . . .	7	3	10
Jeweler . . . . .	1	—	1	Winder (electrical work) . . . . .	—	1	1
Jewelry worker . . . . .	1	—	1	Wood chopper . . . . .	1	—	1
Junk peddler . . . . .	1	—	1	Wood heel worker . . . . .	—	1	1
Kitchen man . . . . .	1	—	1				
Laborer . . . . .	45	—	45				
Laundry worker . . . . .	—	1	1	Totals . . . . .	281	300	581

TABLE VIII. — *Stage of Disease of Patients Admitted*

	Males	Females	Totals
Early . . . . .	35	63	98
Moderately Advanced . . . . .	116	85	201
Advanced . . . . .	127	139	266
Non-malignant . . . . .	2	11	13
Postoperative . . . . .	1	2	3
Totals . . . . .	281	300	581

TABLE IX. — *Condition of Patients Discharged*

	Males	Females	Totals
Same . . . . .	73	85	158
Improved . . . . .	146	207	353
Unimproved . . . . .	13	18	31
Died (Autopsies 98) . . . . .	133	98	231
Totals . . . . .	365	408	773

TABLE X.

This table includes all new cases treated, both in- and out-patients. In a few instances the same patient has been counted twice or more times, according to the varying conditions presented.

	Males	Females	Totals		Males	Females	Totals
<b>Carcinoma:</b>				<b>Stomach, Liver, etc.:</b>			
Breast . . . . .	1	76	77	Epiglottis . . . . .	2	—	2
Buccal Cavity:				Esophagus . . . . .	8	1	9
Alveolus . . . . .	1	1	2	Hypopharynx . . . . .	2	—	2
Buccal mucosa . . . . .	11	—	11	Liver . . . . .	—	1	1
Floor of mouth . . . . .	9	1	10	Nasopharynx . . . . .	1	—	1
Jaw . . . . .	2	—	2	Pancreas . . . . .	6	—	6
Lip . . . . .	28	3	31	Pharynx . . . . .	1	—	1
Palate . . . . .	5	—	5	Pharyngoepiglottic fold . . . . .	1	—	1
Parotid . . . . .	2	—	2	Stomach . . . . .	31	8	39
Tongue . . . . .	20	3	23	Totals . . . . .	52	10	62
Tonsil . . . . .	7	—	7	Urinary Organs . . . . .	3	—	3
Totals . . . . .	85	8	93	Other sites:			
Female Genital Organs:				Antrum . . . . .	5	4	9
Cervix . . . . .	—	79	79	Bones . . . . .	—	2	2
Ovary . . . . .	—	4	4	Bronchus . . . . .	1	2	3
Uterus . . . . .	—	8	8	Buttock . . . . .	1	—	1
Vagina . . . . .	—	2	2	Larynx . . . . .	7	—	7
Vulva . . . . .	—	5	5	Lung . . . . .	3	2	5
Totals . . . . .	—	98	98	Nose . . . . .	1	—	1
Male Genital Organs:				Pleural cavity . . . . .	1	—	1
Prostate . . . . .	16	—	16	Thyroid . . . . .	2	—	2
Penis . . . . .	4	—	4	Unknown . . . . .	—	1	1
Scrotum . . . . .	1	—	1	Totals . . . . .	21	11	32
Testicle . . . . .	1	—	1	<b>Lymphoblastoma</b>			
Totals . . . . .	22	—	22	Sarcoma:			
Peritoneum, Intestines,				Chest wall . . . . .	1	—	1
Rectum, etc.:				Skull . . . . .	—	1	1
Ampulla Vater . . . . .	—	1	1	Unknown origin . . . . .	1	—	1
Cecum . . . . .	5	—	5	Fibrosarcoma:			
Colon . . . . .	2	—	2	Arm . . . . .	—	1	1
Large Bowel (exact				Mesentery . . . . .	1	—	1
location unknown) . . . . .	—	1	1	Thigh . . . . .	2	—	2
Omentum . . . . .	—	1	1	Not specified . . . . .	1	—	1
Rectum . . . . .	25	10	35	Leiomyosarcoma:			
Sigmoid . . . . .	5	—	5	Cervix . . . . .	—	1	1
Totals . . . . .	37	13	50	Chin . . . . .	1	—	1
Skin:				Rectum . . . . .	—	1	1
Abdominal wall . . . . .	—	1	1	Lymphosarcoma . . . . .	1	—	1
Canthus . . . . .	2	2	4	Melanotic sarcoma:			
Cheek . . . . .	7	7	14	Back . . . . .	1	—	1
Chin . . . . .	1	—	1	Groin . . . . .	1	—	1
Ear . . . . .	4	2	6	Spinal cord . . . . .	—	1	1
Under eye . . . . .	—	1	1	Myxosarcoma:			
Eyelid . . . . .	2	1	3	Abdomen . . . . .	—	1	1
Face . . . . .	5	6	11	Vulva . . . . .	—	1	1
Forehead . . . . .	3	2	5	Myxofibrosarcoma . . . . .	—	1	1
Hand . . . . .	1	—	1	Osteogenic sarcoma . . . . .	4	—	4
Neck . . . . .	1	1	2	Retroperitoneal sarcoma . . . . .	2	—	2
Nose . . . . .	10	7	17	Totals . . . . .	16	8	24
Scalp . . . . .	1	1	2	<b>Other Malignancy</b>			
Scapular region . . . . .	1	—	1	Non-Malignant Tumors:			
Temple . . . . .	2	3	5	Fibromas . . . . .	4	6	10
Totals . . . . .	40	34	74	Lipomas . . . . .	8	9	17
				Papillomas . . . . .	9	9	18
				Polyps . . . . .	—	10	10



TABLE X. — Continued

Males Females Totals				Males Females Totals			
Non-Malignant Tumors— <i>continued</i>							
Hemangiomas . . .	9	9	18	Diseases of the Kidney and Ureter . . .	3	4	7
Epitheliomas . . .	8	11	19	Diseases of the Lungs . . .	1	—	1
Not specified . . .	16	64	80	Diseases of the Liver and Biliary Tract . . .	3	13	16
Totals . . .	54	118	172	Diseases of the Lymphatic System . . .	1	—	1
Other Diseases:				Diseases of the Male Genital Organs . . .	9	—	9
Diseases of Abdomen, Peritoneum, etc. . .	5	9	14	Diseases of Metabolism and Deficiency . . .	1	4	5
Diseases of Bladder . . .	1	7	8	Diseases of Nervous System . . .	8	6	14
Diseases of the Blood . . .	1	—	1	Diseases of the Nose and Accessory Sinuses . . .	3	2	5
Diseases of the Bones, Joints, Muscles, etc. . .	3	12	15	Diseases of the Rectum and Anus . . .	3	8	11
Diseases of the Breast . . .	2	13	15	Diseases of the Skin . . .	3	5	8
Diseases of the Circulatory System . . .	9	14	23	Keratosis . . .	29	25	54
Diseases of the Eye . . .	—	2	2	Totals . . .	32	30	62
Diseases of the Female Genital Organs . . .	—	64	64	Diseases of the Stomach . . .	7	5	12
Diseases of the Intestines:				Diseases of the Tongue . . .	1	3	4
Constipation . . .	3	2	5	Diseases of the Trachea and Bronchus . . .	2	—	2
Diverticulitis . . .	2	—	2	Other Conditions:			
Duodenal Ulcer . . .	6	2	8	Leukoplakia . . .	5	1	6
Hemorrhage (cause unknown) . . .	—	1	1	No Disease . . .	15	20	35
Totals . . .	11	5	16	No Diagnosis . . .	5	5	10
				Not specified . . .	23	12	35

## REPORT OF THE DIVISION OF WATER AND SEWAGE LABORATORIES

H. W. CLARK, *Director and Chief Chemist*

This Division, consisting of laboratories in the State House and the Lawrence Experiment Station and its laboratories, carried on somewhat more than its average volume of analytical and research work during the year 1930. This increase was largely due to the investigation in regard to the condition of Boston Harbor, during which a very large number of chemical and bacterial analyses were made. The results of all the chemical analyses of public water supplies, rivers, sewage applied to and the effluents from municipal sewage disposal areas, etc., are summarized in tables presented in the report of the Division of Sanitary Engineering. Besides the analytical and research work a considerable amount of field work was done during the year in connection with the examination of water supplies, rivers, industrial wastes, shellfish purification, etc.

The following table summarizes the analytical work of this Division and a resumé of some of its research work is given on following pages:

### *State House Laboratories*

Samples from public water supplies:

Surface waters . . . . .	2,811
Ground waters . . . . .	1,667
Samples from domestic wells, ice supplies, swimming pools, etc. . . . .	349
Samples from rivers . . . . .	1,262
Samples in connection with special Metropolitan water supply investigation . . . . .	308
Samples from sewage disposal works:	
Sewages . . . . .	543
Effluents . . . . .	644
Samples of wastes and effluents from factories . . . . .	137
Miscellaneous samples (partial analyses) . . . . .	236
Samples in connection with the investigation of Boston Harbor . . . . .	2,074
Special examinations of water (including field work) for manganese, lead, oil, alkalinity, fats, dissolved oxygen, carbonic acid, hydrogen ion, zinc, arsenic, aluminum, tin, oxalic acid, and mineral analyses . . . . .	3,866
Microscopical examinations . . . . .	3,135

### *Lawrence Experiment Station*

Chemical examinations on account of investigations concerning the disposal of domestic sewage and factory wastes, filtration, and other treatment of water supplies, swimming pools, and the investigation of the Merrimack and other rivers, and Boston Harbor . . . . .	1,566
Mechanical and chemical examinations of sands . . . . .	306
Bacterial examinations of water supplies, rivers, sewages and filter effluents, ice, swimming pools, wastes, etc., including the investigation of Boston Harbor . . . . .	7,051
Bacterial examinations in connection with methods of purification of sewage and water . . . . .	480
Bacterial examinations of shellfish and sea waters . . . . .	831

### EXAMINATION OF SHELLFISH

Determinations of *B. coli* in shellfish have been made at the Lawrence Experiment Station for at least thirty years. Up to December 1904 over 3,000 such tests had been made on shellfish, these including such work as the examination of one hundred and ten samples from the Joppa flats (Newburyport) from June 1902 to February 1903, with the conclusion that variations from season to season were no greater than those from sample to sample. This conclusion was further confirmed by bi-weekly samples covering a year, 1919-1920.

In all this early work and up to about 1912, the usual method of analysis was to plant one cubic centimeter of shell water from each clam or other shellfish in a fermentation tube and also a portion of the intestine of the same clam, observing and reporting fermentation, if any. Cultures from fermentations were carried through the complete examination for *B. coli*. Some members of the coli-aerogenes group, such as *B. cloacae*, were eliminated and streptococci were reported separately. Samples were reported as positive or negative *B. coli* and streptococci and no attempt was made at numerical expression of the results as a regular part of the work. Much attention was paid to counts on nutrient agar and litmus lactose agar plates and at times the red count on the litmus lactose agar plates was reported as *B. coli* apparently for purposes of comparison.

In 1904-1905 and later we used mash samples, as we called them, and determinations were made on the shell water and meats macerated together. In 1905 we first used composites from several shellfish from the same sample, both of shell water and mash samples.

It is interesting to note in connection with the present day so-called gut test (supposed to show more *B. coli* and truer results than the American Public Health Association standard method) that in an investigation by us to study the best methods for shellfish examination during which several hundred samples were examined, we found *B. coli* in about 85 per cent of the shell water samples, 35 per cent of the intestines, 50 per cent of the gills, 20 per cent of the liver, 7 per cent of the tissue, and in 55 per cent of the mash samples. At a later date one hundred and forty-five samples showed 48 per cent of shell water samples and 31 per cent of mash samples contained *B. coli*. The average volume and weight of the various parts of clams were determined on many samples and estimates made of the relative numbers of *B. coli* and other bacteria in each part and in the whole shellfish, but this was not a regular procedure.

From 1912 to 1918 some samples were examined by quantitative estimation of *B. coli* in each of five shellfish in each lot. Plate counts were made and *B. coli* were reported present or absent in the various dilutions of each sample without further attempt to give a numerical result. In May 1919 we first used a score or numerical value for reporting examination of shellfish for *B. coli*. Five shellfish from each sample were examined separately in various dilutions and the score was obtained by adding the reciprocals of the highest dilution of each shellfish containing *B. coli*. Plate counts were made on a composite of each sample.

In 1925 the present procedure was adopted, — equal portions of shell water from five shellfish from each sample are mixed and five fermentations taken in each of as many dilutions as may be found necessary with the score being found as above. Confirmations are made on eosin methylene blue agar. No plate counts are made in our regular procedure.

Besides the examination of samples as collected or as received from the Engineering Division, much experimental work has been done from time to time. In 1911 and 1912 shellfish were cooked as described in various standard cook books, and it was shown that generally ordinary methods of cooking could not be depended on to destroy all dangerous bacteria.

In 1925 a very thorough study was made of the collection of shellfish samples. Some of the things considered were glass jars as against pasteboard cartons, the use of sterile tongs on the flats, the necessity of icing, the desirability of ventilating cartons, and the effect of time between collection and analysis of samples. Our conclusions were that shellfish taken by hand and slightly washed in near-by sea water and packed in ordinary cartons, kept cool and in the dark (in very hot weather icing may be necessary) and not more than twenty-four hours in transit, gave representative results.

In 1925 and from time to time since that year we studied various procedures for preparing shellfish for examination. As a result of these studies we adopted our present standard practice which is as follows: The hands are thoroughly cleaned, the shells of the samples are freed from mud, sand, etc., by scrubbing with the fingers under the running tap, surplus water is shaken off and the samples are placed upon clean paper to await opening. The scalpel used for opening is scrubbed clean in running water and dried in an open flame. We have found this method much the fastest we have ever tried and very free from chance of contamination. Even with quahaugs and the roughest shelled oysters, we find this method safe.



In 1925 twenty lots of shellfish, both opened and in the shell, were kept for varying periods of time in the refrigerator and at ordinary room temperature, and examined frequently, both bacterially and for general condition. We found that *B. coli* gradually decreased in number in shellfish kept in storage and that good clams in the shell may be stored up to seven days without materially affecting their quality or salability.

In 1926 we made a study of the relationship between *B. coli* scores in shellfish and in sea waters from the same locality. We found a substantial agreement,—clams having scores of 0 to 23 were found in water with a mean content of about 4 *B. coli* in 100 cubic centimeters; clams with scores of 23 to 50 in water with a mean content of about 35; and shellfish with scores over 50, that is, not passing the standard, in water of a mean content of over 100. We suggested at that time that the standard for water over shellfish beds be set, if at all, at not over 100 *B. coli* in 100 cubic centimeters.

In 1925–1926 and to some extent later we performed experiments on the effect of shucking of clams upon their score, and found that under proper conditions with reasonable care there should be no increase in the score of the freshly shucked clams. In 1926 we isolated 277 cultures of bacteria, which we report in our usual procedure of analysis as *B. coli*, and carried them through the entire scheme of examination as given in the sixth edition of "Standard Methods" of the American Public Health Association, page 108. Only three cultures (1 per cent) were rejected as not true typical members of the coli-aerogenes group, thus indicating that for regular work, steps A, B, and C were sufficient.

In 1916 our first attempts at purification by chlorine were made. Little was accomplished in this early work largely because we used too high concentrations of chlorine. In 1925 laboratory experiments on purification were again begun and we learned that clams would tolerate something less than 1 part per million of chlorine; that higher amounts were useless; that 0.5 part per million was sufficient with forty-eight hours' treatment; that aeration or frequent change of water was necessary and that it was possible to destroy or reduce *B. coli* without imparting a taste or odor or otherwise affecting the palatability or appearance of the clam.

In 1927 we transferred our experiments to Plum Island bridge and conducted them on a larger scale, using the knowledge gained in our first studies. Further information was obtained which largely confirmed our conclusions concerning chlorine, air, change of water, etc. We stated in our report that "the process appears to be practical in warm weather and there is no reason to doubt it will be the same in cold weather."

In 1928 we assisted in planning the first plant of the city of Newburyport at the end of Plum Island and also in checking its operation and results. In 1930 commercial plants were put in operation at Newburyport and Plymouth. There have arisen differences of opinion regarding the amount of chlorine necessary, that is, whether or not it should be maintained continuously or intermittently, the amount of aeration and agitation necessary and other details of operation. Studies are still being made along these lines.

These two commercial plants have been successful in reducing the score of the shell water but the United States Public Health Service has devised a so-called gut test which is similar to the mash samples which we used as far back as 1904. In this gut test the samples are prepared for analysis by shaking the shucked meats with iron turnings and sterilized water and sampling and scoring the resulting suspension. The standard method gives a measure of the number of *B. coli* in the shell water of the clam while the gut test is supposed to give a measure of the *B. coli* in the meat. The following table shows the results of a number of examinations of clams before and after twenty-four hours' treatment. Many other tests have been made which were not on the same clams before and after treatment with chlorine.



*B. Coli in Shellfish by Different Methods*

SAMPLE	Standard Method Score	Gut Test Score	SAMPLE	Standard Method Score	Gut Test Score
Salisbury:			Newburyport:		
Raw:			Raw:		
Dec. 12	50	140	Dec. 12	41	41
13	23	50	13	5	32
14	23	41	14	32	140
15	32	32	15	41	50
Treated:			Treated:		
Dec. 11	23	50	Dec. 11	5	50
12	5	14	12	2	23
13	50	41	13	23	50
14	32	23	14	5	14
Average of the raw clams				31	66
Average of the treated clams				18	33
Percentage of reduction				42	50

These results show that the percentage reduction of *B. coli* is fully as great in the meat as in the shell water. The standard method is so much simpler and more adapted to the handling of a large number of samples that unless the gut test shows a marked superiority there would seem to be no necessity for adopting it. The standard method has generally been considered satisfactory for untreated clams and there seems to be no necessity for a different method for clams that have undergone chlorine treatment.

## BIOCHEMICAL OXYGEN DEMAND

The study of the biochemical oxygen demand, or B.O.D. as it is commonly called, of the Merrimack River, which was begun last year and results of which were given in the last annual report, was continued during 1930 and series of samples were collected from June 20 to November 14, inclusive, at the New Hampshire lines a the river enters Massachusetts and above and below Lowell, Lawrence, Haverhill, and Amesbury.

The average results of the ten series, together with the similar results of last year are shown in a diagram. The cumulative B.O.D. of the domestic sewage of Lowell, Lawrence, and Haverhill on a per capita basis of 50 grams of oxygen a day as explained last year, adjusted to the flow of the river, is also included for comparison. The effect on the oxygen demand of the river water and more or less directly on the degree of pollution of the river by trade wastes is strikingly shown in this diagram; that is, as the diagram proves, the oxygen demand of the river water due to the entering domestic sewage is at no point more than 40 per cent of the total oxygen demand and below Lawrence is only about 10 to 15 per cent of this demand, the remainder being due to the mill wastes.

The per cent of saturation of the river water with dissolved oxygen was also determined and is shown in a second diagram. The study does not attempt to take into account effect of tributaries or variations in stream flow. It simply shows the average condition of the river at the time of sampling on ten different days, which probably pretty fairly represents the true conditions.

The B.O.D. as determined is, of course, an arbitrary measure of the dissolved oxygen that may be absorbed from the river water by the entire organic matter under definite uniform conditions which practically never occur in the river itself. If, however, the limitations of the test are fully understood, it has considerable value in indicating the pollution entering a stream and its limitation in overcoming this pollution.

The river contained an unusual number of the smaller green microscopic organisms during the year. This was particularly noticeable from below Haverhill to Newburyport. Each particle of suspended matter in the water appeared to be coated with organisms and as it is well known that these organisms release free oxygen as part of their activities, it is probable that the higher dissolved oxygen in the lower reaches of the river during 1930 than during 1929, was partly due to their presence in the water.

Diagram (1) Showing the Biochemical Oxygen Demand of the Water of the Merrimack River.

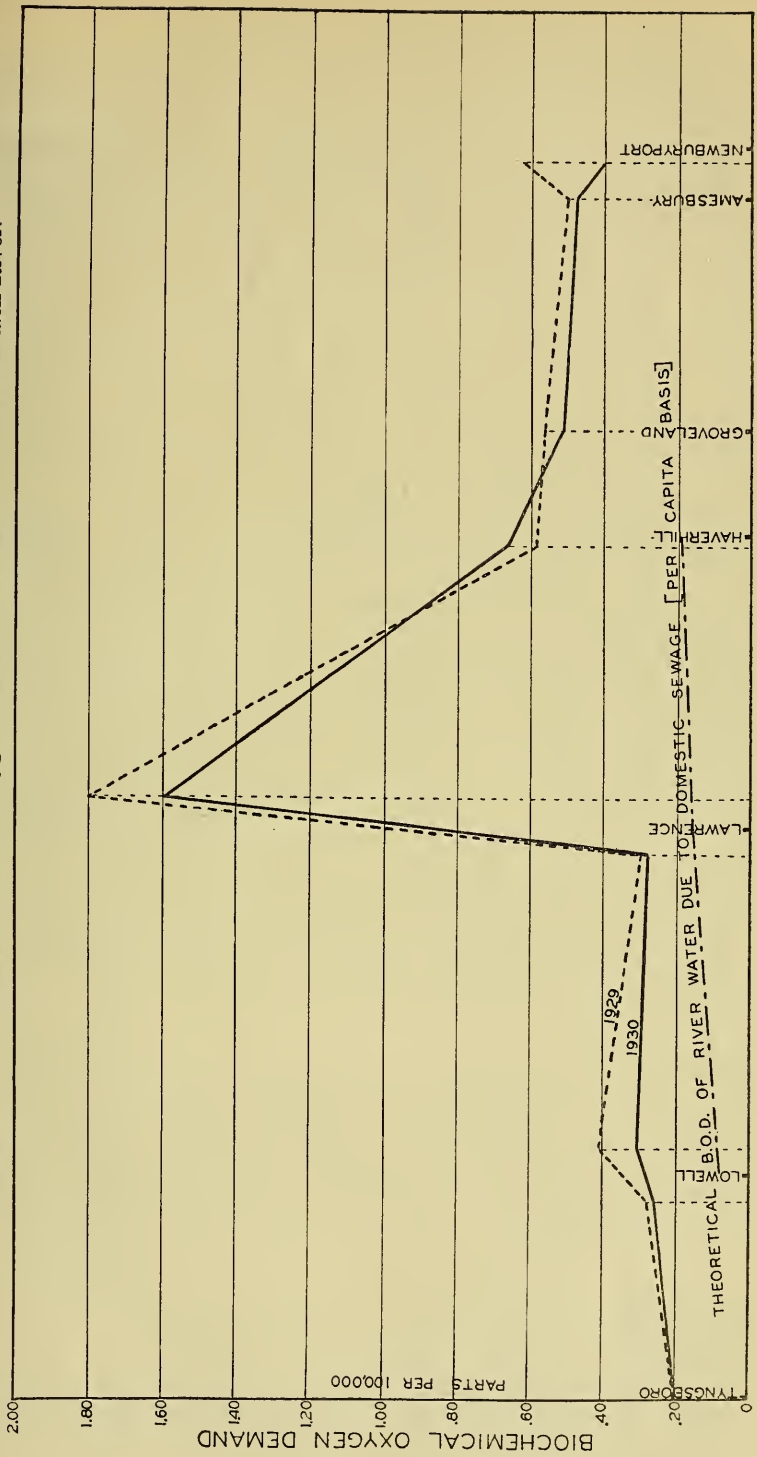
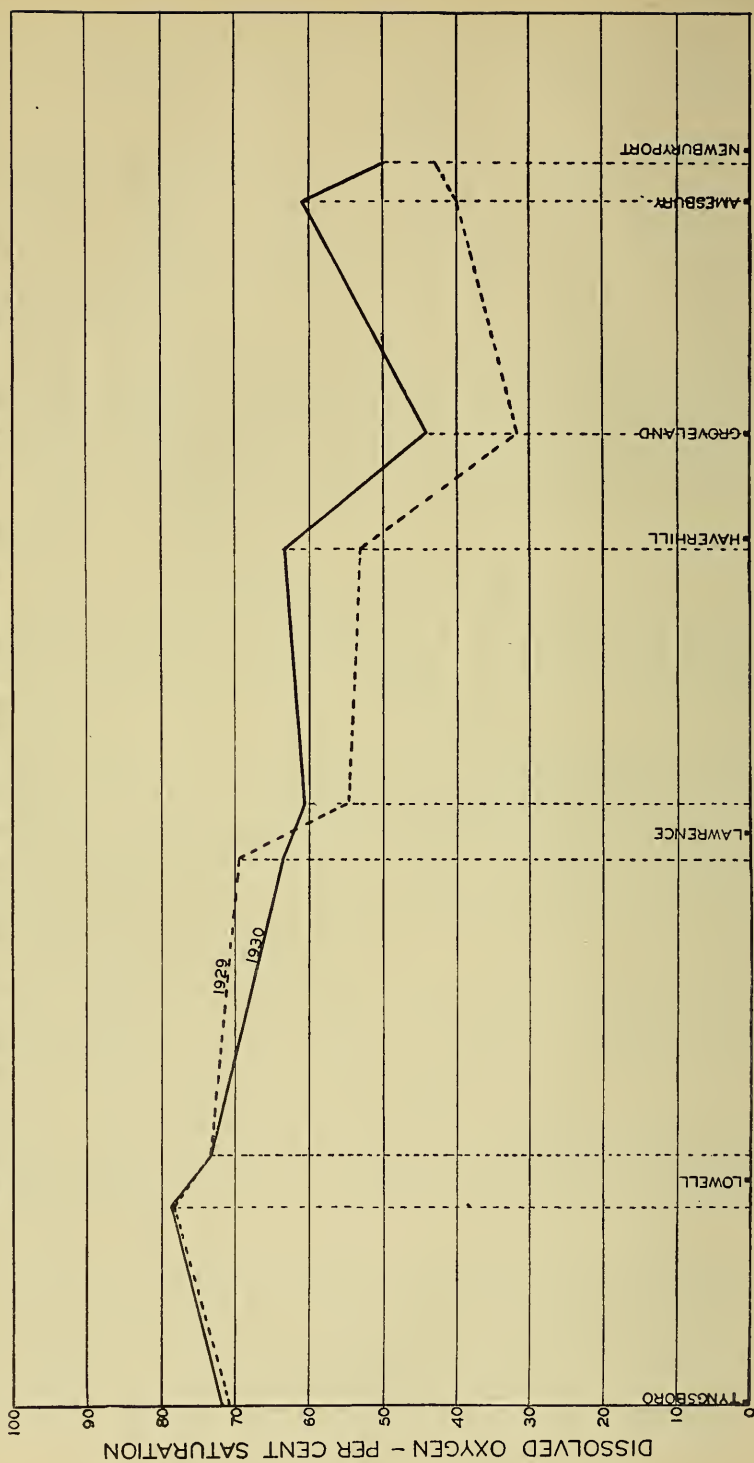


Diagram (2) Showing the Amount of Dissolved Oxygen in the Water of the Merrimack River.



STUDIES OF WASTES FROM TANNERIES, FELT WORKS,  
GLUE WORKS, AND GELATIN WORKS

Since 1913 a large amount of research and analytical work has been carried on by this Division on the wastes from various industrial plants in Peabody and Salem engaged in the production of leather, felt, glue, and gelatin. In 1922 a special study was made of all the plants (more than fifty in number) in this district engaged in these industries, with especial attention to those turning caustic lime into the sewers. This was done as this caustic lime when meeting the  $\text{CO}_2$ , set free by the decomposition of the domestic sewage in the sewers, changed to carbonate and this carbonate seriously encrusted and clogged the sewers of this district. During this investigation it was found that while fifteen of the plants contributed lime to the sewers, 96 per cent of this lime came from nine of these plants and amounted to from twelve to twenty-three or twenty-four tons daily according to whether business in these industries was poor or good. Lime is used in the tanneries in the dehairing process; for the treatment of the raw material, that is, scraps of hide, hoofs, etc., in the manufacture of glue and gelatin; and in the manufacture of felt it occurs as a residue of the dehairing treatment in the tanneries.

Laboratory studies showed that treatment with flue gas, containing generally from 7 to 10 per cent of  $\text{CO}_2$ , would produce carbonation and precipitation of this caustic lime, and in a report of this Division in 1923 the following statement was made: "The only feasible way of preventing the entrance of this caustic lime into the sewers is to treat the wastes containing it with carbonic acid. This carbonic acid could be obtained by connecting with the stacks at each plant and blowing flue gas through the liquids," that is, through the wastes, amounting in the case of one of these industries to more than 1,000,000 gallons daily.

In 1927 it was evident that the lime was not only being deposited in the local sewers but was also clogging the new \$1,800,000 sea outlet of this district. Hence in this year efforts were made to induce the industries to construct such carbonating plants and at the present time they are being slowly installed, the first being constructed in 1928. Briefly, the plant is as follows and is based to some extent on plants used for carbonating domestic water supplies after certain purification treatments: The gas is drawn from the stack of each plant through pipes of wrought iron and cooled by the use of certain makes of coolers. They consist generally of a set of copper tubes enclosed in a water-tight cylinder and the gas passing through the pipes is cooled by circulating water. This cooling water is subsequently used for feeding the boilers at these industries. The gas is then passed through air filters to remove carbon, tar, etc., and after this filtration, it is compressed by a rotary gas pump and discharged through wrought iron pipes to a grid of pipes with perforated openings, suspended in settling tanks containing the wastes. These plants if introduced and capably watched and managed are successful in accomplishing the desired results. This treatment is, of course, for the caustic lime in solution. At some of the plants, however, the wastes contain large amounts of this lime in suspension and this is, or should be, removed by sedimentation before carbonating the liquid.

Certain objections to the process have been made from time to time by the industries and their chemists, but these objections have been very largely overcome. One very persistent criticism was that over-carbonation would result in the formation of bicarbonate and this would mean increased scale formation in the sewers if wastes containing large amounts of this bicarbonate came in contact with wastes containing calcium hydroxide. This danger was proved to be largely theoretical; that is, it might occur if carbonation was done with straight  $\text{CO}_2$ , but when carried on with flue gas containing never more than 10 per cent  $\text{CO}_2$  the formation of bicarbonate is negligible.

In analytical work the usual method used for determining the amount of calcium hydroxide in the waste is by titration with standard acid, using phenolphthalein as an indicator. When sodium carbonate is also present, half of its alkalinity will be included in this determination. To avoid this, however, a small amount of barium chloride solution is added and this reacts with the sodium carbonate to form barium carbonate which does not appear as alkalinity in the titration.

In some of the plants sodium hydroxide is used. This caustic alkali must be treated the same as calcium hydroxide because in the presence of soluble calcium



salts an equivalent amount of calcium hydroxide will be formed and it was demonstrated by laboratory experiments that a mixture of calcium chloride and sodium hydroxide deposited calcium carbonate in the presence of carbon dioxide just as calcium hydroxide does. It can be stated as the conclusion of much laboratory research and operation of several complete carbonating plants in the district studied, that the carbonation process is not only chemically sound but practical. The main difficulties encountered have been in maintaining a good distribution of flue gas in the precipitation tanks and to a less degree to compressor and scrubber troubles. These are not serious, however.

#### DIGESTION OF LAWRENCE SEWAGE SLUDGE WITH NITRIFIED SEWAGE FILTER EFFLUENT

One of the results of satisfactory filtration of sewage is the production of large amounts of nitrates. It is often desirable to reduce these nitrates before effluents containing them enter streams owing to the encouragement they give to growths of microscopic organisms in such streams with disagreeable results. During the past two years a study of nitrate reduction has been made, as follows:

The sludge removed from the settling tank supplying the Lawrence Experiment Station filters has been digested with a well-nitrified sewage filter effluent in Tank No. 483. This tank consists of three compartments, 20 inches in diameter and 6 feet deep. The sludge is collected three times a week and added to each compartment for six weeks in rotation, giving a maximum storage of eighteen weeks. The filter effluent is applied continuously to the bottom of the first compartment, passing from the top of the first to the bottom of the second and so on. The sludge added contained on an average only .7 per cent dry solids hence the liquid portion was taken into account in the analysis of the applied filter effluent and in calculating the loss of nitrogen. The average loss of nitrogen from the applied filter effluent in passing through the tank was 28.4 per cent, and there was probably a loss of nitrogen from the sludge itself although this would be difficult to determine accurately.

The volume of nitrified effluent applied to Tank No. 483 during the year was somewhat larger than necessary for the amount of sludge in the tank. About ten gallons of effluent were passed through for each gallon of sludge. For greatest efficiency the effluent of the digestion tank should contain only enough nitrate to insure stability. Last year the period of digestion was twelve weeks compared with eighteen this year. The longer period gave a greater fat reduction and a more stable sludge but the difference was not great enough to warrant the longer storage; in fact, probably six weeks' digestion would be sufficient. The sludge after digestion was inoffensive and compared favorably with good Imhoff sludge. If local conditions permit, the addition of nitrified effluents would also be valuable in correcting conditions in digestion tanks that were not operating properly.

#### *Digestion of Sewage Sludge from Other Cities with Nitrified Sewage Filter Effluent*

Sludges from Fitchburg, Marlboro, Framingham, and Clinton settling tanks were digested in bottles in the laboratory with some of the same filter effluent as applied to Tank No. 483 and in from thirty-nine to forty-four days, they were inoffensive and resembled Imhoff sludge except that the sludge particles were somewhat coarser. The raw sludges were acid, with a pH of about 5.6 and very foul-smelling, but as the nitrates in the effluent used are reduced the alkaline base, which is set free, neutralizes the sludge and raises the pH to one more favorable for digestion. The amount of gas produced is much smaller than in normal fermentation and consists largely of nitrogen with some methane. The carbon dioxide is mostly fixed as carbonate by the base of the nitrates.

The amounts of oxygen absorbed from nitrates by these sludges and by Lawrence sludge in Tank No. 483 are shown in the following table. They are expressed as per cent by weight of oxygen used or absorbed by the organic portion of the sludges. The four sludges digested in the laboratory would have consumed considerably more oxygen if the digestion had been prolonged, but it was sought only to render them inoffensive.

<i>Sludge from:</i>	<i>Per Cent Oxygen Absorbed</i>
Clinton . . . . .	15.4
Framingham . . . . .	10.8
Marlboro . . . . .	22.6
Fitchburg . . . . .	29.7
Lawrence . . . . .	9.7

These results constitute a sort of B. O. D. test and the amounts of oxygen absorbed are also roughly proportional to the offensiveness of the sludges. It is also of interest to note that in various normal digestion experiments Lawrence sludge, with the lowest oxygen demand, was the most readily digested and that Fitchburg sludge, with the highest demand, the hardest to digest.

### *Sludge Digestion — Study of Effect of Enzymes*

In most raw sewage sludges, spontaneous fermentation starts very slowly. In many cases this is due to acid conditions in the sludge. Usually when raw sludge is seeded with a ripe sludge in the proper proportions, fermentation takes place. A number of reasons have been advanced for this; that the ripe sludge furnishes the proper bacterial flora; that it neutralizes the acidity of the raw sludge; or that it furnishes enzymes.

A number of enzymes have been identified in fermenting sludges, but the addition of definite enzymes to sludges has shown little effect. It seems very likely, however, that some enzymic action is necessary to make the solids of sludge available for bacterial growth with resulting gas production. It is further likely that these enzymes are formed by the bacteria. It was thought that acid sludge might not furnish the proper conditions to support active growth of the bacteria forming the enzymes so various nitrogenous substances were added to a number of sludges that would not ferment readily alone. Pepsin, peptone, trypsin, diastase, and gelatin were tried. The results were inconclusive, because in some cases good fermentation was obtained while in others the amount of gas produced was less than that from sludge alone. This is just another instance of the difficulty in controlling the factors entering into sludge digestion, some of which are probably unknown.

### *Sludge Analyses*

	PER CENT ON DRY BASIS		
	Fats	Nitrogen	Loss on Ignition
Sludge from Station Tank applied to Tank No. 483 . . . . .	31.2	3.19	76.5
Sludge from Tank No. 483 after 18 weeks' storage . . . . .	14.9	3.47	59.2
Sludge from Imhoff Tank No. 545 . . . . .	12.0	3.67	57.3

### *Average Chemical Analyses*

#### *Effluent from Sand Filters applied to Sludge Digestion Tank No. 483 (Including Liquid Portion of Added Sludge)*

[Parts in 100,000]

SOLIDS						AMMONIA			NITROGEN AS --	
UNFILTERED			FILTERED			Free	ALBUMOID		Nitrates	Nitrites
Total	Loss on Ignition	Fixed	Total	Loss on Ignition	Fixed		Total	In So- lution		
-	-	-	-	-	-	1.15	.17	-	2.39	.0059
Effluent from Sludge Digestion Tank No. 483										
41.2	13.9	27.3	37.0	12.4	24.6	1.62	.21	.11	1.02	.0654

### CEMENT-LINED PIPES

During the past three years considerable work has been done at the Experiment Station in regard to the use of cement-lined pipes in connection with water supplies. Some data in regard to this have been given in the last two reports.

Danvers has used pipe of this sort ever since the water system was installed. Apparently there has been little complaint of hardness or taste where there has been a good circulation; house services on cement-lined mains with dead ends have, however, received water of excessive hardness. This increased hardness is largely due to calcium hydroxide and calcium carbonate or calcium bicarbonate. The carbonate hardness would be most noticeable from its action with soap although it would not be disagreeable to the average taste. The caustic hardness produces the same effect with soap and also the characteristic slippery feeling of caustic solutions, and, worst of all, a disagreeable taste.

Samples were collected at Danvers in May, 1928, and again in July, 1930, from several services near dead ends. The different forms of alkalinity of these samples are shown in the following table:

[Parts in 100,000]

WATER FROM	Phenolphthalein Alkalinity		Methyl Orange Alkalinity		Hardness	
	1928	1930	1928	1930	1928	1930
Service No. 1	2.8	1.2	4.5	2.9	6.0	5.0
" " 2	1.5	4.2	2.7	5.9	3.4	7.6
" " 3	4.3	2.1	6.3	3.9	10.0	6.0
" " 4	4.2	0.0	6.0	3.5	10.0	6.2
" " 5	7.4	5.4	9.2	7.0	11.0	9.2
Pumping station	0.0	0.0	1.0	0.7	2.1	1.9

All results are expressed in terms of calcium carbonate. The phenolphthalein titrations, if expressed as calcium hydroxide would be only 74 per cent as high as the values in the table. The analyses show how long the caustic alkalinity may persist. In every case but one there was a decided reduction in hardness in the twenty-six months between the collection of the two series of samples and the reduction is probably proportional to the amount of water passed through the mains. The one instance where there was an increase was probably due to sampling, that is, the water had not stood in the main for the same length of time in each case. The highest amount of caustic alkalinity found in any service was 8.9 parts calcium hydroxide in 100,000 but in some experiments in which water under pressure was allowed to stand over a year in a new cement-lined pipe, the maximum caustic alkalinity was 17.6 parts calcium hydroxide.

#### *Effect on Copper and Brass*

In this study the question naturally arose as to the effect this caustic alkalinity would have on copper and brass piping and fixtures and a number of laboratory experiments were made to study this as follows:

Strips of clean sheet copper and brass were placed in stoppered test tubes containing different strengths of caustic lime and soda solutions. One set of tubes was kept at room temperature and the other heated to near the boiling point during the day. After ten weeks the following results were obtained.

[PARTS IN 100,000]	Blackening			
	Room Temperature		Heated	
	Copper	Brass	Copper	Brass
50 sodium hydroxide	0	0	+	0
50 calcium hydroxide	+	0	+	+
50 calcium hydroxide	+	vs1	+	+
25 calcium hydroxide	0	0	+	0
Tap water	0	0	vs1	0

Where there was any action, the alkali caused a blackening of the metal but the black substance formed was not a sulphide.

A commercial process of producing a black adhering coating on brass consists in forming a substance of approximately the composition  $\text{CuCO}_3 \cdot \text{Cu}(\text{OH})_2$  by treatment with an ammoniacal solution of basic copper carbonate and it seems probable that the black deposit in these experiments was of a similar composition. It is important to note that ordinary qualitative tests did not show any copper in solution but if a sufficiently large volume of liquid had been taken for the test, traces of copper would probably have been found.



The experiments as a whole indicate that the amount of the black deposit is small and probably acts as a protective coating against further action and the amounts of caustic found in water from cement-lined mains are so much smaller than those used in these experiments that the effect on copper and brass in household piping would be negligible. As far as could be learned there had been no complaints about corrosion of copper or brass pipes in Danvers or elsewhere.

#### LOWELL WATER SUPPLY

##### *Addition of Soda Ash to Cook Well Water — Condition of Filters*

Lowell, in common with many other cities and towns, suffered from a shortage of water during 1930. To meet this, certain changes in the municipal filtration plant were made and water from the Cook wells was used during the year for a longer period than usual. One of the objections to the use of Cook well water is the high free carbon dioxide, with resulting danger of lead poisoning. To correct this condition a dry feed apparatus was installed on June 13 to add soda ash to the water as it was pumped to the mains. This was continued for about ten weeks, when due to certain objections its use was discontinued.

The average free carbon dioxide in the raw water was 2.8 parts in 100,000 and the average in the treated water on seven different days was 1.0 part. The addition of soda ash changed the average pH from 6.1 to 7.1, and increased the alkalinity 5.2 parts. This increase in pH should, of course, decrease the corrosive action of the water, but it was stated at Lowell, probably on insufficient data, that the treated water stirred up the rust deposits in the mains and hence an unsatisfactory water was obtained.

Previous to the use of the Cook wells in 1930, there had been complaint about black deposits from the mains appearing at certain services and it was thought from the color of these deposits that manganese oxides might have passed through the filters and then precipitated in the mains. Samples collected at some of the worst points on the system and analyzed showed, however, in the black color due to ferrous hydroxide. In an examination of the filter early in the year, it was found that all the gages showing loss of head and the Venturi meters of the sand filters were out of commission and could not be repaired until the frost was out of the ground in the spring. Hence there was no way of checking the rate of operations of any of the six sand filters and it was evident that some of them were clogged with deposits of iron and manganese, this lowering their rate of operation while others were being operated at too high a rate. There was evidence also that some water was reaching the pumping station without passing through the sand filters. The free carbon dioxide in the filtered water during the winter averaged 1.6 parts due probably to clogged coke filters and poor operation. During the past summer the control instruments of the filters have been put in good condition and some of the coke and sand has been washed and replaced.

#### CHARACTER OF THE SEWAGE USED FOR INVESTIGATIONS UPON SEWAGE PURIFICATION AT THE LAWRENCE EXPERIMENT STATION

The sewage for the various filters, pumped to the Experiment Station through about 1,850 feet of pipe, is a fairly strong domestic sewage free from trade wastes. The coarser suspended matter is excluded by a strainer on the end of the pipe in the sewer.

The following tables present the average analyses of sewage used during the year. "Regular sewage" is the sewage as pumped to the Station; "settled sewage" is the sewage after passing through Imhoff Tank No. 545 and receiving a slight additional settling in a large tank used for supplying all the filters at the Station, except Nos. 1, 4, and 9A which receive the effluent of Imhoff Tank No. 545.

#### IMHOFF TANKS

One Imhoff tank was operated during the year. It is of concrete, 20 feet deep, with a settling compartment 7 feet 4 inches long by 1 foot wide and with gas vents 1 foot square at each end. The bottom of the settling compartment has a slope of 45 degrees towards the center where there is a slot opening. This settling compartment has a capacity of 715 gallons and the digestion compartment, 357 gallons, giving a theoretical storage of one and one-half hours during the five hours or so that the sewage is being pumped.



Settleable solids were removed during the year at the rate of 550 pounds of dry matter per million gallons of sewage. The digested sludge, as drawn monthly, was entirely inoffensive, black in color, contained an average of 7 per cent dry matter and had a pH of around 7.0. The average composition of the dry sludge was, — fats, 12 per cent; nitrogen, 3.67 per cent; and loss on ignition, 57.2 per cent. One hundred and seventy-eight pounds of dry matter were withdrawn and 480 pounds were added. This tank would undoubtedly digest a much larger amount of fresh solids if they were available. Judging from laboratory experiments, Lawrence sludge as collected at the Station is more readily digestible than sludges containing more vegetable matter, such as enter most large Imhoff installations.

*Average Analyses  
Regular Sewage  
[Parts in 100,000]*

AMMONIA			KJELDAHL NITROGEN		Chlorine	Oxygen consumed	Bacteria per Cubic Centimeter
Free	ALBUMINOID		Total	In Solution			
	Total	In Solution					
5.15	.94	.67	1.65	1.16	8.8	6.48	2,100,000
Effluent from Imhoff Tank No. 545							
4.80	.89	.53	1.60	.96	8.4	6.09	1,730,000
Settled Sewage							
5.10	.58	.42	1.01	.73	8.6	4.37	1,729,000

*Average Solids  
Regular Sewage  
[Parts in 100,000]*

UNFILTERED			FILTERED			IN SUSPENSION		
Total	Loss on Ignition	Fixed	Total	Loss on Ignition	Fixed	Total	Loss on Ignition	Fixed
70.2	37.9	32.3	46.3	20.8	25.5	23.9	17.1	6.8
<i>Effluent from Imhoff Tank No. 545</i>								
62.0	32.1	29.9	45.7	21.2	24.5	16.3	10.9	5.4
<i>Settled Sewage</i>								
54.8	27.4	27.4	44.0	21.0	23.0	10.8	6.4	4.4

OPERATION OF HOUSEHOLD SEPTIC TANKS

Two small septic tanks of the household type have been operated at the Station since June, 1920. These tanks, Nos. 507 and 508, are of concrete construction. The first is 4 feet long, 2 feet wide, and 40 inches deep, with a sloping bottom and a capacity of 185 gallons; the second contains two compartments of the same size as the first. Sewage enters each tank through trapped inlets and discharges through a pipe reaching 15 inches below the surface of the sewage in the tank. A baffle is placed one-third of the distance from the inlet to the outlet and reaches to within 8 inches of the bottom of the tank. The first tank receives fresh household sewage and the second, Lawrence sewage, a comparatively stale sewage. Both tanks are so operated that theoretically the sewage is held within each for two days. During most of the entire period of operation, the effluents from both tanks have been remarkably clear and comparatively odorless, although a slight hydrogen sulphide odor has been noted in these effluents occasionally. Both tanks have been opened for observation and sludge measurements six times since 1920, and results in regard to this have been given in previous reports. They were not opened during 1930.

The sludges in both tanks have been practically odorless and resembled good Imhoff sludge.

*Average Analyses*  
*Fresh Sewage applied to Closed Septic Tank No. 507*  
 [Parts in 100,000]

AMMONIA			KJELDAHL NITROGEN		Chlorine	Oxygen consumed	Bacteria per Cubic Centimeter
Free	ALBUMINOID		Total	In Solution			
	Total	In Solution					
5.53	1.39	.71	2.55	1.30	6.4	9.30	2,550,000
Effluent from Closed Septic Tank No. 507							
5.39	0.62	.42	1.08	0.72	6.6	4.23	1,910,000
Regular Sewage applied to Closed Septic Tank No. 508							
5.25	1.01	.59	1.77	1.03	7.8	5.25	1,730,000
Effluent from Closed Septic Tank No. 508							
4.63	0.41	.29	0.67	0.49	7.8	2.56	1,380,000

*Average Solids*  
*Fresh Sewage applied to Closed Septic Tank No. 507*  
 [Parts in 100,000]

UNFILTERED			FILTERED			IN SUSPENSION		
Total	Loss on Ignition	Fixed	Total	Loss on Ignition	Fixed	Total	Loss on Ignition	Fixed
89.4	54.8	34.6	55.8	26.6	29.2	33.6	28.2	5.4
<i>Effluent from Closed Septic Tank No. 507</i>								
52.1	22.3	29.8	41.9	16.9	25.0	10.2	5.4	4.8
<i>Regular Sewage applied to Closed Septic Tank No. 508</i>								
62.2	32.6	29.6	42.7	18.5	24.2	19.5	14.1	5.4
<i>Effluent from Closed Septic Tank No. 508</i>								
42.7	16.1	26.6	38.3	13.6	24.7	4.4	2.5	1.9

ACTIVATED SLUDGE PROCESS

Experiments on the aeration of sewage have been carried on at the Lawrence Experiment Station continuously since 1912, and descriptions and results of the various tanks have been published in the annual reports of the Department. Activated sludge Tank No. 485, started in 1917, is still in operation. It consists of three compartments 75 inches deep, each holding 230 gallons. The overflow from the last, comprising the purified sewage and considerable sludge, passes through two settling tanks of 600 and 160 gallons' capacity, allowing about five and one-half hours' sedimentation during which the activated sludge settles out and is then pumped back to the first compartment. Air is applied at the bottom of each compartment through a filtros plate clamped to the top of an iron box. The rate is approximately a total of .33 cubic feet of air per gallon of sewage. The tank is operated at the rate of 5,650,000 gallons per acre daily on the basis of the aerating and settling tanks, or 10,000,000 on the basis of the activating tanks alone. It has been the custom to retain about 20 per cent by volume of sludge in the tank, the excess being pumped to waste from time to time. During the year this surplus was at the rate of 324 pounds of dry sludge per million gallons of sewage treated. The sewage applied to this tank was passed through an Imhoff tank and then received some settling in the supply tank. By the preliminary settling and the activated sludge process 918 pounds of suspended solids per million gallons of sewage were removed. The dry activated sludge examined during the year contained 5.4 per cent nitrogen and 5.5 per cent fats.

*Average Analyses*  
*Sewage applied to Activated Sludge Tank No. 485*  
 [Parts in 100,000]

APPEARANCE		AMMONIA			KJELDAHL NITROGEN		Chlorine	NITROGEN AS —		Oxygen consumed	Bacteria per Cubic Centimeter
Turbidity	Color	Free	ALBUMINOID		Total	In Solution		Nitrates	Nitrites		
			Total	In Solution							
—	—	4.70	1.11	.59	1.85	1.05	8.6	—	—	6.23	1,729,000
<i>Effluent from Activated Sludge Tank No. 485</i>											
0.5	.55	2.52	0.23	.16	0.45	0.29	8.2	.43	.1027	1.57	360,000

*Average Solids*  
*Sewage applied to Activated Sludge Tank No. 485*  
 [Parts in 100,000]

UNFILTERED			FILTERED			IN SUSPENSION		
Total	Loss on Ignition	Fixed	Total	Loss on Ignition	Fixed	Total	Loss on Ignition	Fixed
69.4	36.9	32.5	44.0	21.1	22.9	25.4	15.8	9.6
<i>Effluent from Activated Sludge Tank No. 485</i>								
35.1	11.5	23.6	32.7	10.0	22.7	2.4	1.5	0.9

### TRICKLING FILTERS

#### *Studies of Nitrification at Various Depths*

During past years a number of studies have been made at the Experiment Station on the degree of nitrification at different depths in trickling filters. For certain practical reasons in regard to the economy in construction and operation of filters, it was decided to repeat this work. Accordingly, on July 1, 1929, three new trickling filters, Nos. 571, 572, and 573, were started. They are of identical construction, 10 feet deep, 20 inches in diameter (1/20,000 of an acre in area) and contain crushed stone that will pass a 1½-inch screen and be retained on a ¾-inch screen.

At depths of 4, 6, and 8 feet, half-round sections of ¾-inch iron pipe are inserted to the center of the filter to collect small portions of the effluent. These pipes are staggered, that is, they are not directly one over the other, and are also pitched slightly toward the outlet. As the filters are made of sections of Akron pipe with open joints, the effluent from the iron pipes drips into the bell of the section of Akron pipe below and enters the filter again. However, the amount collected by these pipes is so small that it could have no appreciable effect on the operation of the filter.

While these filters were identical in construction and rate, the sewage was applied differently. Filter No. 471 was supplied by a tipping basin device of the same size as regularly used at the Experiment Station, delivering about 360 cubic centimeters at each emptying. Filter No. 572 had a tipping basin of about half this size and Filter No. 573 was dosed by a siphon arrangement delivering about a gallon at a time and requiring about a minute and a half to drain.

The average rate of the filters was 1,435,000 gallons per acre daily, giving dosing intervals of 1.9, 0.8, and 20.7 minutes, respectively. Comparison of the analyses shows that the effluents of the first two are nearly of the same degree of purification, while the effluent of Filter No. 573 is considerably less purified. Apparently, the optimum dosing interval is somewhat shorter than twenty minutes and is not critical around two minutes.

In the relative stability tests shown in an accompanying table, the shortest dosing interval gives the best results at depths of 4 and 6 feet; at depths of 6 and 10 feet,



the effluents of all three filters have relative stabilities of 98 and 99+, respectively, these high stabilities indicating that the filters were not operating at their maximum rates.

It has been shown at the Experiment Station by other filters of the same material but of different depths that the deeper filters are much more efficient in proportion to their depth than the shallower filters. It has been the opinion of some investigators, however, that most of the purification is effected before the lower section of deep filters is reached and therefore that filters as deep as 10 feet are uneconomical.

While it is realized that it is not the logical way to express results, the following table shows that nitrification is active in the lower sections of the filters, which explains the greater efficiency of the deep filters.

Nitrification at Different Depths.\*

[Parts in 100,000]

DEPTH	NITROGEN AS NITRATES PER FOOT OF FILTER DEPTH		
	Filter No. 571	Filter No. 572	Filter No. 573
Surface to 4 feet . . . .	.21	.15	.08
4 feet to 6 feet . . . .	.09	.285	.19
6 feet to 8 feet . . . .	.265	.20	.20
8 feet to 10 feet . . . .	.185	.26	.10

\*For complete nitrification results see table page 228.

Eight other trickling filters were operated during the year. The oldest, No. 135, containing 10 feet in depth of walnut-size stone, has been in operation thirty-one years. Filters Nos. 452-455, inclusive, contain 4, 6, 8, and 10 feet, respectively, of crushed stone that will pass a 1½ inch screen and be retained by a ¾-inch screen. Filter Nos. 473-475, inclusive, contain 6, 8, and 10 feet, respectively, of coarser crushed stone, passing a 2½-inch to 3-inch screen and retained by a 1½-inch screen.

Aeration of Applied Sewage

The sewage applied to Filter No. 452 was aerated by blowing air through it until the dissolved oxygen was equal to about 0.5 part in 100,000. This was simple aeration without activation. At a rate of 1,189,000 gallons per acre daily this filter, only 4 feet deep, gave an effluent of a relative stability of 98 per cent and practically equal to the effluent of Filter No. 453, 2 feet deeper and operated at 768,000 gallons per acre daily but receiving un aerated sewage.

Ordinarily, a portion of the upper section of a trickling filter is really devoted to aerating the applied sewage before aerobic action begins. Aerating the applied sewage is equivalent to adding to the depth of the filter but it does not necessarily follow that this is an economical process.

Average Analyses

Effluents from Trickling Filters Nos. 135, 452, 453, 454, 455, 473, 474, and 475

[Parts in 100,000]

FILTER NUMBER	Quantity Applied — Gallons per Acre Daily	AMMONIA			Kjeldahl Nitrogen	Chlorine	NITROGEN AS —		Oxygen consumed	Bacteria per Cubic Centimeter
		Free	ALBUMINOID				Nitrates	Nitrites		
			Total	In So- lution						
135	1,462,000	1.51	.30	.23	.56	8.2	2.28	.0093	2.41	277,000
452	1,189,000	2.39	.57	.34	.99	8.5	1.59	.0387	3.66	1,100,000
453	768,000	2.18	.50	.27	.89	8.8	1.48	.0210	3.29	300,000
454	1,921,000	1.83	.37	.25	.65	8.6	1.70	.0213	2.36	297,000
455	3,854,000	2.13	.46	.27	.81	8.4	1.58	.0175	3.18	593,000
473	576,000	2.18	.40	.24	.75	8.5	1.54	.0295	2.69	310,000
474	1,481,000	2.88	.47	.27	.91	8.6	.81	.0233	2.64	493,000
475	3,084,000	2.58	.52	.30	.97	8.5	1.08	.0260	3.23	614,000



*Average Solids*  
*Effluents from Trickling Filters Nos. 135, 452, 453, 454, 455, 473, 474, 475,*  
*571, 572, and 573*

[Parts in 100,000]

FILTER NUMBER	UNFILTERED			FILTERED			IN SUSPENSION		
	Total	Loss on Ignition	Fixed	Total	Loss on Ignition	Fixed	Total	Loss on Ignition	Fixed
135	53.3	22.4	30.9	45.9	18.9	27.0	7.4	3.5	3.9
452	57.9	25.7	32.2	44.6	18.7	25.9	13.3	7.0	6.3
453	59.4	23.4	36.0	43.5	17.0	26.5	15.9	6.4	9.5
454	49.1	21.4	27.7	42.5	18.1	24.4	6.6	3.3	3.3
455	52.5	23.5	29.0	40.7	17.4	23.3	11.8	6.1	5.7
473	49.0	21.4	27.6	40.3	16.0	24.3	8.7	5.4	3.3
474	47.0	18.4	28.6	39.6	14.4	25.2	7.4	4.0	3.4
475	52.2	22.5	29.7	40.1	15.6	24.5	12.1	6.9	5.2
571	66.2	28.3	37.9	46.4	19.9	26.5	19.8	8.4	11.4
572	62.2	28.1	34.1	46.1	19.6	26.5	16.1	8.5	7.6
573	61.6	28.2	33.4	44.9	19.0	25.9	16.7	9.2	7.5

*Average Analyses*  
*Effluents from Trickling Filters Nos. 571, 572, and 573 collected at*  
*Different Depths*  
*Filter No. 571*

[Parts in 100,000]

Depth (Feet)	AMMONIA			Kjeldahl Nitrgoen	Chlorine	NITROGEN AS —		Oxygen con- sumed	Bacteria per Cubic Centi- meter
	Free	ALBUMINOID				Nitrates	Nitrites		
		Total	In Solu- tion						
4	3.89	.80	.37	1.47	8.6	0.84	.0343	4.45	830,000
6	3.28	.84	.36	1.57	8.5	1.02	.0401	4.73	530,000
8	2.69	.70	.29	1.27	8.4	1.55	.0258	4.03	320,000
10	2.85	.70	.28	1.30	8.2	1.92	.0270	4.14	280,000

*Filter No. 572*

4	3.90	.96	.45	1.71	8.5	0.59	.0408	5.01	1,930,000
6	2.90	.76	.36	1.16	8.5	1.16	.0380	4.49	1,160,000
8	1.55	.74	.30	1.35	8.3	1.56	.0320	4.48	720,000
10	2.07	.59	.25	1.06	8.2	2.08	.0297	3.67	460,000

*Filter No. 573*

4	3.95	1.01	.49	1.85	8.4	0.33	.0347	5.23	1,700,000
6	3.43	.87	.43	1.61	8.4	0.71	.0363	4.73	1,340,000
8	3.32	.93	.39	1.67	8.3	1.29	.0330	5.16	720,000
10	2.88	.71	.34	1.22	8.2	1.49	.0398	4.21	550,000

*Table showing Average Relative Stabilities*

Filter Number	Relative Stability	Filter Number	Relative Stability
1	99+	485	94
4	99+	471, 4 feet	48
9	99+	6 "	58
135	99+	8 "	98
175	99+	10 "	99+
449D	30	572, 4 "	55
452	98	6 "	87
453	99+	8 "	98
454	99+	10 "	99+
455	99+	573, 4 "	20
473	99+	6 "	53
474	87	8 "	98
475	89	10 "	99+
483	94	574	54

OPERATION OF CONTACT FILTERS

Only one contact filter, No. 175, is now in operation, as a study of the permanency of this type of filter and as an example of this method of sewage purification. It was started in 1901, is 1/20,000 of an acre in area and contains 39 inches in depth of coke passing a 1-inch screen and retained on a 1/4-inch screen.

During 1930, the filter was operated one five-hour cycle daily with sewage which had passed through an Imhoff tank and received a small amount of settling in a storage supply tank. It was allowed to rest one week six times during the year.

The effluent was well nitrified and always stable but contained rather more suspended matter than when the filtering material was cleaner.

Since 1901, it has been necessary to remove and wash the filtering material twice, once in 1911 and again in 1920. Since 1920, the open space has decreased 29 per cent.

### INTERMITTENT SAND FILTERS OPERATED WITH UNTREATED SEWAGE *Filters Nos. 1, 4, and 9A*

Each of these filters is 1/200 of an acre in area and at the end of the year Nos. 1 and 4 had been operated forty-three years and No. 9A forty years. Up to January 1926 they received regular sewage without preliminary settling but for the last five years the sewage applied has been passed through an Imhoff tank where some suspended solids have been removed. Filters Nos. 1, 4, and 9A were operated at rates of 46,800, 20,700, and 48,500 gallons per acre daily, respectively, during 1930. For many years there has been but little increase in the amount of organic matter stored in the filters.

Filter No. 1 contains 5 feet in depth of sand of an effective size of 0.48 millimeter; Filter No. 4, 5 feet in depth of sand of an effective size of 0.04 millimeter, and Filter No. 9A, 5 feet in depth of sand of an effective size of 0.17 millimeter. The surface of Filters Nos. 1 and 9A are trenched and ridged late in the fall, board coverings being placed over these trenches and the trenches on Filter No. 4 to help prevent the sand from freezing. The surface of Filter No. 4 is permanently arranged in circular trenches, 14 inches wide, which are filled to a depth of 12 inches with sand of an effective size of 0.48 millimeter. Sewage is applied to these trenches, grass being allowed to grow on the ridges.

The acidity of these effluents is gradually increasing and this is due to free nitric acid, there not being sufficient alkali in the sewage to combine with the nitric acid resulting from the oxidation of the free ammonia and nitrogenous matter. In earlier years of operation the deficiency was made up by alkali extracted from the sand, but now this supply seems to be exhausted. This acid condition has had no definite effect on the operation of the filter, but it is intended to add sufficient alkali to the sewage in 1931 to neutralize the acid.

### *Average Analyses Effluent from Filter No. 1* [Parts in 100,000]

TEMPERATURE (DEGREES F.)		AMMONIA		Chlorine	NITROGEN AS —		Oxygen con- sumed	Alkalinity	Bacteria per Cubic Centimeter
Applied	Effluent	Free	Albumi- noid		Nitrates	Nitrites			
57	51	.9214	.0825	7.3	3.30	.0018	.73	-2.4	35,000
<i>Effluent from Filter No. 4</i>									
57	50	.2163	.0272	8.0	3.50	.0090	.35	-3.4	835
<i>Effluent from Filter No. 9A</i>									
57	51	.6487	.0525	6.3	2.54	.0006	.54	-2.2	5,200

### LAWRENCE CITY FILTERS

As usual this report presents data in regard to the operation during the past year of the slow sand filters for the purification of the water supply of Lawrence. Lawrence has taken its water supply from the Merrimack River since 1875 and since 1893 it has been filtered. Since 1918 the filtered water has been treated with chlorine as an added factor of safety. Three filters are in use. The oldest, 2.2 acres in area, is divided into three sections, one of which is covered; the second, 0.75 of an acre in area was built in 1907 and is also covered; the third filter covered also, was completed early in 1926 and is 0.75 of an acre in area. The average volume of water filtered daily during 1930 was 4,305,106 gallons, about 2 per cent less than last year. Liquid chlorine was applied as a solution at the pump-well at the average rate of 1.44 parts in 1,000,000. This amount of chlorine is very high compared with what is used in other localities, but has proved to be necessary. The bacterial removal by the various filters is generally over 99 per cent. The remaining bacteria which are comparatively few in number appear to require more

chlorine for their destruction than would normally be expected. There have been no complaints about chlorine tastes on the low service which supplies the greater part of the city from the reservoir, but owing to the arrangement of the pump intakes and chlorine supply, the high service water frequently receives an excess of chlorine and some complaints have been received. This condition is to be remedied during 1931 by pumping from the reservoir to the high service standpipe. By this arrangement the water for both services will receive the same chlorine treatment.

*Average Bacterial Analyses*  
*Merrimack River — Intake of the Lawrence City Filters*

BACTERIA PER CUBIC CENTIMETER			PER CENT OF BACTERIA REMOVED			PER CENT OF SAMPLES CONTAINING B. COLI					B. Coli in 100 cc.
4 Days 20° C.	24 HRS.—37° C.		4 Day 20° C.	24 HRS.—37° C.		.001 cc.	.01 cc.	0.1 cc.	1.0 cc.	10 cc.	
	Total	Red		Total	Red						
8,500	390	110	—	—	—	0	43	96	100	100	5,000
<i>Effluent from the Lawrence City Filter (Old Filter, East Open Section)</i>											
77	4	1	99.1	99.0	99.1	0	0	0	4	33	7
<i>Effluent from the Lawrence City Filter (Old Filter, East Covered Section)</i>											
68	4	0	99.2	99.0	100.0	0	0	0	8	41	11
<i>Effluent from the Lawrence City Filter (Old Filter, West Open Section)</i>											
100	7	1	98.8	98.2	99.1	0	0	2	13	55	33
<i>Effluent from the Lawrence City Filter (North Filter)</i>											
68	4	1	99.2	99.0	99.1	0	0	1	9	45	22
<i>Mixed Effluents as Pumped to the Distributing Reservoir after Chlorine Treatment</i>											
10	3	0	99.9	99.2	100.0	0	0	0	0	0	—*
<i>Water from the Outlet of the Distributing Reservoir</i>											
39	4	0	99.6	99.0	100.0	0	0	0	0	6	—*
<i>Water from a Tap at Lawrence City Hall</i>											
38	3	0	99.6	99.2	100.0	0	0	0	0	4	—*
<i>Water from a Tap at the Lawrence Experiment Station</i>											
50	3	0	99.4	99.2	100.0	0	0	0	0	1	—*
<i>Water from a Tap on the High Service System</i>											
51	4	0	99.4	99.0	100.0	0	0	0	0	2	—*

\*Less than 1.

*Average Chemical Analyses*  
*Merrimack River — Intake of the Lawrence City Filter*  
[Parts in 100,000]

TEMPERATURE (DEGREES F.)	APPEARANCE		AMMONIA			Chlorine	NITROGEN AS —		Oxygen consumed	Iron	Hardness
			Free	ALBUMINIOD			Nitrates	Nitrites			
	Turbidity	Color		Total	In Solution						
53	0.2	.36	.0244	.0282	.0187	.45	.019	.0009	.69	.0705	1.9
Effluent from the Lawrence City Filter (Old East Filter)											
53	0.1	.54	.0346	.0101	—	.49	.030	.0003	.49	.2200	2.3
Effluent from the Lawrence City Filter (North Filter)											
53	0.0	.22	.0054	.0095	—	.46	.028	.0003	.50	.0294	1.8
Water from the Outlet of the Distributing Reservoir											
53	0.0	.33	.0120	.0103	—	.63	.031	.0002	.46	.0968	2.0

*Water from a Tap at Lawrence City Hall*

54	0.0	.33	.0098	.0104	—	.64	.030	.0002	.44	.1027	2.0
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*Water from a Tap at the Lawrence Experiment Station*

54	0.0	.33	.0088	.0093	—	.64	.029	.0002	.43	.1048	2.0
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*Average Solids**Merrimack River — Intake of the Lawrence City Filters*

[Parts in 100,000]

UNFILTERED			FILTERED			IN SUSPENSION		
Total	Loss on Ignition	Fixed	Total	Loss on Ignition	Fixed	Total	Loss on Ignition	Fixed
6.79	2.83	3.96	6.00	2.43	3.57	.79	.40	.39

*Effluent from the Lawrence City Filter (Old East Filter)*

6.81	2.36	4.45	—	—	—	—	—	—
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*Effluent from the Lawrence City Filter (North Filter)*

5.75	2.03	3.72	—	—	—	—	—	—
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*Water from the Outlet of the Distributing Reservoir*

6.10	2.14	3.96	—	—	—	—	—	—
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*Water a Tap at Lawrence City Hall*

6.20	2.15	4.05	—	—	—	—	—	—
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*Water from a Tap at the Lawrence Experiment Station*

6.27	2.20	4.07	—	—	—	—	—	—
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EFFECT OF STORAGE OF WATER ON THE BACTERIAL COUNT  
AND ON FILTRATION

During the last half of the year two concrete storage tanks were constructed for the purpose of storing water and studying the effect of this storage upon bacterial reduction. The first studies are being made with Merrimack River water containing its usual high number of bacteria and while the experiment has not gone far enough to draw specific conclusions it is apparently true that when this water is fifty days in passing through these tanks the bacterial reduction is about 90 per cent, this reduction aiding materially, of course, in increasing rates of filtration.

## COLOR REMOVAL FILTERS

The color removal filters, fully described in previous reports, have been continued in operation. The results are summarized in the following tables.

*Data on Operation of Color Removal Filters since Beginning of Operation*

FILTER NUMBER	Year Started	AVERAGE GRAINS PER GALLON OF WATER FILTERED		Number of Times Treated with NaOH	Average Number of Days between Treatments	Average Color
		Caustic Soda	Ferric or Aluminum Sulphate			
River water	—	—	—	—	—	.40
488	1917	.40	.044	66	64	.14
494	1918	.37	.059*	63	62	.16
496	1918	.13	.020	18	211	.08
535	1929	.20	.43	2	213	.14
536	1924	.27	.11	22	81	.14
563	1928	.15	.51	4	185	.10
564	1928	.15	.51	4	185	.11
565	1928	.15	.51	4	185	.10
566	1928	.15	.51	4	185	.15

\*Aluminum Sulphate.



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# SEVENTEENTH ANNUAL REPORT

OF THE

## DEPARTMENT OF PUBLIC HEALTH OF MASSACHUSETTS

### REPORT OF THE PUBLIC HEALTH COUNCIL

At the end of the fiscal year closing November 30, 1931, the Department of Public Health was constituted as follows:

Commissioner of Public Health . . . . . GEORGE H. BIGELOW, M.D.

#### PUBLIC HEALTH COUNCIL

GORDON HUTCHINS, 1934  
FRANCIS H. LALLY, M.D., 1933  
ROGER I. LEE, M.D., 1933

SYLVESTER E. RYAN, M.D., 1934  
RICHARD P. STRONG, M.D., 1932  
JAMES L. TIGHE, B.A.Sc., C.E., 1932

During the year fifteen formal meetings of the Department were held, which included besides the twelve regular monthly meetings a visit to the Lakeville State Sanatorium and a shellfish chlorinating establishment, visits to the Mystic River, the Charles River, the Blackstone River, and the Worcester sewage disposal works, and two hearings in connection with the removal of personnel.

As heretofore, the Committee on Sanitary Engineering, composed of Mr. Tighe, Chairman, Mr. Hutchins and Dr. Bigelow, has met prior to the regular monthly meeting of the Council and submitted its recommendations on all matters of sanitary significance.

The practice of visiting institutions under the direction of the Department has been continued by a morning spent at the Lakeville State Sanatorium. Also, through visits, conferences and reports the Council has kept in touch with the legislative studies of the Mystic and Charles Rivers and the problem of sewage disposal on the Ware River watershed. These studies have been made jointly with the Metropolitan District Commission and the Metropolitan District Water Supply Commission respectively, and from time to time the Council has met with these Commissions and has submitted reports to the Legislature, as required. The Council has held hearings on various matters as required by statute, has revised regulations as experience indicated, has approved appointments submitted by the Commissioner, and has considered, advised and promulgated policies on the various matters coming within the scope of the Department.

As already mentioned, the Department was designated by Chapter 22 of the Resolves of 1930 to cooperate with the Metropolitan District Commission on a two-year study relative to the creation of a Mystic River Basin. By Chapter 20 and Chapter 40 of the Resolves of 1931, similar joint studies relative to improving the condition of the Charles River in the cities of Waltham and Newton and the towns of Weston and Watertown and relative to the Charles River Valley sewer of the South Metropolitan Sewerage District, respectively, were directed. Further, by Chapter 66 of the Resolves of 1931, the Department and the Metropolitan District Water Supply Commission jointly were directed to study the problem of sewage disposal from certain portions of the Ware River watershed in order to protect the Metropolitan supply. These four studies have been made and reports duly submitted to the Legislature.

At a meeting of the Department on January 12, 1932, the Commissioner of Public Health presented to the Council a report of the doings of the Department for the year 1931, and after discussion it was voted that this report, together with the foregoing brief summary of the activities of the Public Health Council, be approved and adopted as the report of the Department of Public Health for the year 1931.

SEVENTEENTH ANNUAL REPORT OF THE COMMISSIONER OF  
PUBLIC HEALTH

*To the Public Health Council:*

GENTLEMEN: I have the honor to submit herewith my annual report for the fiscal year ending November 30, 1931, although, as has been the practice of late, all figures except those relating to the budget will be given for the calendar year.

As in previous reports I should like to start by summarizing certain matters of outstanding interest or importance. The union of two groups of towns has become an accomplished fact, one the Southern Berkshire Health District (16 towns), the other the Nashoba Health District (14 towns). This movement, given impetus by a grant from the Commonwealth Fund of New York City, gives promise of solving the problem of adequate rural health service under our philosophy of local self government. During the summer and fall 1,428 cases of infantile paralysis (exceeded only in 1916) called for a special appropriation from the Governor's emergency fund and the closest cooperation with the Harvard Infantile Paralysis Commission so that in the Connecticut Valley, which was hardest hit, over 75 per cent of the cases were seen in consultation. So extensive a service on so large a scale has, we believe, never before been developed. The good citizenship of the 620 previous sufferers from the disease who freely offered their blood to help others is heartening in a commercialized world. Typhoid, tuberculosis, diphtheria, whooping cough and measles have been unusually low. The study extending the availability and usefulness of serum in pneumonia, which has also been made possible by a grant from the Commonwealth Fund of New York City, is well under way in areas covering half the population of the State. With the opening of the admirable Middlesex County Tuberculosis Hospital we are on the way to having more beds in relation to our tuberculosis problem than any other state in the Union, but with less than 20 per cent of these beds occupied by early and favorable cases it is apparent that we critically need more early recognition of cases, toward which end we are asking legislative aid this year. The Rockefeller Foundation is continuing its aid toward studying our very large volume of tuberculosis data, and has also granted aid toward a further study of cancer and other chronic diseases. Rabies killed four persons, sent 525 dog heads to our laboratory, and was responsible for the reporting of 6,878 bitten persons. Surely the toll in money, pain and mental anguish was enormous. But it seems that efforts at sustained restraint are futile and for the present at least we should concentrate on encouraging the voluntary protective inoculations of dogs even though we realize that the present method does not yield complete protection in every case. Under a committee appointed by Governor Ely two institutes and 160 other speaking engagements have been arranged to build an informed public opinion as to the important findings from the White House Conference on Child Health and Protection. Five small outbreaks spread by raw milk have been identified. Three of these were typhoid fever so that our record of annual milk-borne typhoid since 1886, broken only in 1929 and 1930, is again resumed. Surely the menace of the small raw milk route must be recognized. Minimum health regulations as a guide to small communities have been approved and printed and have already proved useful. Evidence of further improved reporting of gonorrhea and syphilis may possibly mean some improvement in the treatment these diseases are generally receiving since a realization of their importance is necessary for both. After five years of outstanding and effective service as Deputy Commissioner Dr. Clarence L. Scamman left us to join the staff of the Commonwealth Fund, which would have strained our gratitude for their generous grants had we not been so fortunate as to have Dr. Gaylord W. Anderson to succeed him. Again none of the legislation proposed by the Department was passed, and again it is interesting to theorize as to whether this is more of a reflection on us or on others. The effect of the present economic situation on disease and death rates is of great interest and importance. We agree with the United States Public Health Service that from any reliable data that we have the immediate effect has not been unfavorable. This presumably means that the sum total of restraints made necessary during depressions are, so far, less unhygienic than the sum total of excesses made possible during more prosperous times.



## I. GENERAL MATTERS

*Union Health Districts.* — The Nashoba and Southern Berkshire Health Districts have been in operation only some eight months, and not all the staff members have been employed that long. Again when it is realized that the former includes 14 and the latter 16 towns, and that that means 42 and 48 members of boards of health respectively, and twice that number of officials when the importance of the cooperation of the school committees is considered, it will be seen that it is far too early to look for anything like final results. However, it can be said that the members of the boards of health concerned have shown a fine sense of appreciation of the problem involved and a disinterested district consciousness, and the success of these ventures will redound to their everlasting credit. Already through the use of the health officers as representatives of the Harvard Infantile Paralysis Commission, through prompt control of milk-borne disease, through the development of special pneumonia services, the extension of the hospital laboratory services, and through the uniform and prompt handling of the problems incident to the common communicable diseases, the physicians of the district, and through them the public, are appreciating what competent professional public health service in communicable diseases can accomplish. In the field of sanitary inspection the improvement in the hands of professional personnel is fully as striking. In the field of public health nursing the situation is perhaps more subtle and therefore complicated. Both districts already had many nurses under varying auspices covering with varying adequacy varying phases of the broad field of public health nursing. The final integration and supplementing of existing resources will take time and intelligence and the development of a fine informed public opinion for their support and proper utilization. Later in this report more details of this work are given. But here I wish to record that these two districts have started admirably. A vision of what this type of health district can mean to all of rural Massachusetts and New England has been given to us. May we not be found wanting in our appreciation and ability as statesmen.

*Minimum Local Regulations.* — Massachusetts, the cradle of local self government, alone among the states has no uniform quarantine regulation. A town may quarantine a disease forever or not at all, restrained only by its ability to prove reasonableness of regulation to the courts. In 1927 quarantine requirements recommended by the Department were approved by the Massachusetts Association of Boards of Health and published by the Department. These have now been adopted, practically in their entirety, by 111 cities and towns representing 32 per cent of the population. Encouraged by this success, a committee of the Association and this Department drew up suggestions for the guidance of boards of health in preparing regulations, applicable particularly to smaller communities and dealing with such matters as milk, food and nuisances as well as quarantine. These have been similarly approved and published, and it is hoped will encourage uniformity and effectiveness. The two Health Districts have used them in formulating their regulations.

*Surveys.* — We have been in and are perhaps passing out of the epidemic era of health surveys, and the Department has suffered from the virus as well as almost all other health agencies of the country. The sum total of improvement in towns so surveyed has been microscopic compared with the time and energy expended. When kind things were said there was mild gratitude; when there was criticism or suggestion it was met either with indifference or resentment which often impaired future contacts with the Department, though, I must say, resentment is less discouraging than indifference. So general purposeless surveying by our district health officers or others has been stopped. When there is a particular objective like a program for dental hygiene, school health, public health nursing, tuberculosis hospitalization, a grouping of towns in a health district, yes, many times yes! But let the survey therapy of the Department be specific and not palliative.

*Advisory Committees.* — It has been said that committees and commissions are the curse of government in this country; that the People think fact finding groups merely a method of eluding individual responsibility; that these same People thirst for the romance and inspiration of a self sufficient dictator or despot. While benevolent despotism is ideal and efficient, history proves that you can be surer of



your despotism than your benevolence. Then one man's meat is another man's poison and how can one man with any reasonable chance of success decide in multiple complex ramifying problems what is wisest to do in the current state of incomplete knowledge of, by and for the people. His decisions are likely to be in spite of, without and against the people. In government the dramatic and the dangerous are often synonymous. Thus we have taken advantage of the Massachusetts precedent for public service and the rich resources of our teaching center to call small specially informed groups as advisory committees on various acute, sub-acute, and chronic problems that beset us. The subjects covered by these committees are adult hygiene, cancer, dental hygiene, nutrition, occupational therapy, pneumonia, public health nursing, public health social service, tuberculosis, and the White House Conference on Child Health and Protection. No health department has a richer field of competent professional and lay persons on which to call than we in Massachusetts. Whatever of success has been or will be accomplished in the above fields must in great measure be credited to our advisory committees.

*Broadcasts.* — Some health departments pay for their radio time, but such has not been our practice. Throughout the year there have been three weekly broadcasts and of late a fourth has been added. I am somewhat at a loss to account for the willingness, and in some instances eagerness, of stations to give us time. Is it the depression; a vague feeling that through us the station can help establish itself as a public service; or merely a vague feeling of good citizenship? In any case we are grateful and no little harassed. One broadcast is generously prepared for us by a committee of the Massachusetts Medical Society and presented with all the anonymity required by medical ethics, thereby losing most of its publicity value. Another has had to do with the work of the Department in its various fields and will next year be expanded to deal with general health matters. A third carries over the radio the Department Health Forum now carried weekly by forty-nine local newspapers. The fourth now running for three months deals with such special matters as personal hygiene at varied ages, the White House Conference, and cancer. Every once in awhile we are astonished to get a response to our broadcasts. But as the American people who live in an atmosphere of radio verbiage are developing an immunity to any ideas that may be incorporated in such a verbal barrage (otherwise their reason might be unseated) the radio is apparently one of the less effective methods of publicity. While it is free we must utilize it, but to pay, except in unusual circumstances, would seem unwarranted. Still the newspapers and the spoken word, particularly when followed by newspaper comment, are the sovereign methods of publicity in this country.

*Advisory Social Service Conferences.* — How to obtain specialized professional services for small units is a major administrative problem, and is perhaps at the heart of the rural problem since in the country small units are more inevitable than in the city. The pathologist for the small hospital, the one class teacher for the one room school, engineering supervision of the small water supply, competent clergymen for the small churches, adequate health supervision for the small industry, these and many others occur to one's mind. They form the motive back of grouping of towns for education, water supply, theology, and public health. The nursing and social service professions have thought much on how the technique of intelligent individualization of personal or family problems to the community resources, which I take it is the essence of social service, can be worked out in the country as it has been in the city and still not have the whole thing break down because it cost too much. How familiar that problem is. Plenty of urban communities lack professional service in any field but that is due to their own wickedness for not using a technique that is well established. The lack in rural communities is frequently due to professional wickedness for lack of interest in working out a technique. Again we need cryingly in public health the individualization inherent in social service as we do in medicine. Because of mass treatment in both fields the public may spew us forth. With all this in mind we have started regular conferences by members of our social service staff in one of the Health Districts. These are attended by the health officer and the whole public health nursing personnel of the area to discuss current problems. This should lead to a more intelligent use of resources, a more

constructive recognition and handling of social dilemmas, and a more acute consciousness of blind spots that may eventually be filled in.

*Reorganization of Departmental Nursing.* — For some years now the Department has assumed responsibility for tuberculosis follow-up and has employed with very doubtful effectiveness nurses to this end. The futility of this service is more of a reflection on myself and all others in authority than on our nurses. It is so much easier to start a service than to maintain the discriminating interest necessary to assure its effectiveness. Tuberculosis nursing is a local responsibility just as is school nursing and the disposal of garbage. Therefore we have reduced our tuberculosis field nursing staff to one who shall advise on this matter at least during the transition period. Our consultant nurses have been increased to five and their field has been widened from child hygiene to include tuberculosis and general communicable disease. This is considerably more of a mouth-full and will probably mean that we should have eventually more nurses with smaller districts. This raises the whole question as to whether or not we should have a division of public health nursing. The proponents say that our nurses are in the Division of Child Hygiene, but handle matters of concern to the Divisions of Communicable Diseases, Tuberculosis, Adult Hygiene, and for that matter, all the others. Give the nurses a separate division and all these things will be added unto you. Bunk and applesauce! There are plenty of departments with nursing divisions in which nurses and health officers would no more converse than would Cabots and Kabatznicks. It isn't the title of the division but the mental maturity of the individual that makes for effectiveness. The only department without divisional overlapping is the one containing but a single division. Thus overlapping of interests is inevitable. It is least confusing when divisional lines are drawn around fields of activity rather than professional groups. We must have more discriminating guidance and supervision of our nurses as their programs become more complex, but this can better be accomplished in an existing division, say Child Hygiene, in which field still a majority of their work will be, than in a new mono-professional division of public health nursing.

## II. COMMUNICABLE DISEASE

This year 89,954 cases of communicable disease were reported, or a decrease over 1930 of 11 per cent, due largely to lessened measles and whooping cough. In 1928 the reports went up 23 per cent largely due to measles, in 1929 down 16 per cent due largely to measles, and in 1930 up 17 per cent due largely to measles. The fluctuations, then, are matters over which we have no effective control. However, as the diseases, the prevalence of which we should influence, continue to decrease, the fortuitous measles will have to work harder to maintain a high total communicable disease rate and, even without any increase in our knowledge, will be playing a losing game since the susceptibles, children, are constituting a decreasing proportion of our population.

*Outbreaks.* — Thirteen outbreaks of communicable disease were recorded, all of them relatively small except for infantile paralysis, but significant as indicating vulnerability. Five were caused by infected small raw milk supplies. Two of them were septic sore throat in both of which an infected cow was identified, slaughtered and autopsied. Three were typhoid, caused in two instances by carriers and in one by a "walking" case. These emphasize what Crumbine has repeatedly pointed out in his annual reports to the Conference of State and Provincial Health Authorities of North America, that it is the small raw milk supplies that are spreading disease among the people of this country. We have pointed out the same thing in Massachusetts, namely, — that the total number of cases of milk-borne disease has decreased much more rapidly than the total number of outbreaks.

There was a small typhoid outbreak in a construction camp due to a cook who was a typhoid carrier. Yet we offer free to every employer of the State bacteriological examination of his food handlers. Six cases of smallpox demonstrated classically the effectiveness of vaccination since all the vaccinated who were exposed were uninfected and all the unvaccinated exposed were infected. But still the opposition to vaccination raged and the Legislature preserved an almost Gilbertian indifference. Emotions and not facts rule people. The statesman sentimentalizes



facts, the demagogue sentimentalizes fallacies. The health officer usually fails to do either.

There were two sharp outbreaks in schools. One of diphtheria was limited entirely to the unimmunized children; one of scarlet fever was confused by mildness, the inevitable closing of schools and the unpardonable delay in competent daily inspection with prompt exclusion on suspicion. Till established active immunization is given to us, such futility in scarlet fever will be as inevitable as was the interminable wholesale culturing of schools in the pre-immunization days of diphtheria. One summer camp rocked with streptococcus throats of apparently parental origin. It seems to be as revolutionary to limit the visiting of parents to summer camps as it is to zoos. If parents are fortunate enough to be able to send their children to summer camp why shouldn't they make the best of the vacation, for themselves, if not for their children, and keep away?

There was one fairly widespread outbreak of acute gastroenteritis in a town, the cause of which was conventionally enough never determined even after fairly intensive epidemiology. Such outbreaks are popularly blamed to the obvious, whatever at the moment it may be. Since the obvious can often be neither ruled out nor in, the health officer is in a particularly futile and embarrassing position. May our betters in the laboratory add generously to our bacterial knowledge in this field.

*Anterior Poliomyelitis* (Infantile Paralysis). — This year there were 1,428 cases and about 114 deaths reported as contrasted with 1927 cases and 452 deaths in 1916 which was the only year on record in excess of this. The initial focus appears to have been in New York City from where it spread through Connecticut to us. Thus, we had some weeks warning. Why, with freedom of intercourse it should not have spread explosively and why it spread from New York City north and east rather more than south and west are enigmas at present veiled from us. Through the closest possible cooperation with the Harvard Infantile Paralysis Commission and a prompt and generous appropriation by His Excellency Governor Ely, extensive service was developed which went far to keep popular panic below what it was in 1916 when medical certificates were required for travel, summer camps were wholesally evacuated, towns were isolated and lap dogs were wrested from emotional women.

The service consisted of clinics in 29 communities for the collection of blood from generous donors who had had the disease previously. Of 620 volunteers, 427 were used to give 120 liters of blood or enough to treat 700 patients. The Governor wrote his personal appreciation to each donor. Our laboratory processed the serum and it was tested and distributed by the Harvard Commission. Further, up to sixteen consultants were used, some of them members of the Department staff, so that any physician at any time might have service in regard to diagnosis of early cases and, if suitable, the administration of serum. Half of all the cases in the State were thus seen in consultation and in the Connecticut Valley it was 75 per cent of the cases. Also cooperatively the Harvard Commission held orthopedic follow-up clinics in 13 communities in an effort to appraise the results of serum treatment and, where desired, to give physicians advice in the specialized field of after-care.

Considering the size and complexity of the problem, the relatively large area to be covered, and the pressure under which the service was expanded, the people must feel well repaid for the expenditure of their \$10,000 and profoundly grateful for the existence of the Harvard Infantile Paralysis Commission within their State. In considering this service for future years, we wrote to some 500 physicians using it. Half have already replied. Of these, 97 per cent desired it continued as it was this year. Is this State medicine or are all but 3 per cent of these doctors wrong?

It will be some time before all the data collected from this outbreak will be in shape for publication by the Commission.

*Rabies.* — As was said in the opening statement, efforts at synchronous quarantine of dogs by all communities of the State was a lamentable failure. Four human deaths (three in three successive days) goaded us to such an effort. Ninety-nine communities responded, 256 did not, or if they did they kept it a secret even from the dogs. Of 525 dog heads examined in our laboratory 304 were positive. With stray dogs spreading the disease, the entire State was potentially exposed.

Dog bites were reported in 6,878 persons. The anguish of many exposed people coming to us for advice was shocking. Yet support was sporadic, while the opposition of indifference, sportsmen and commercial dog interests was organized and loud mouthed. We failed utterly.

From now on we shall recommend the voluntary widespread use of protective inoculation of dogs. It should be voluntary rather than compulsory since it is yet far from completely protective. But with the present public indifference to restraint it is the most promising protection there is to offer.

*Typhoid Fever.* — With only 250 cases and a death rate of 0.70 per 100,000 of the population, a low record for the State has been made. In 1928 it was 0.85, in 1929 0.99, and in 1930 it was 0.89. In 1928 Minnesota was our most formidable rival among the states for favorable typhoid rate. Whether they have equalled us this year we do not know. For further improvement we must look to such cities as Lowell which in 1930 had the highest typhoid rate of any northeastern city. The able health officer of Lowell is taking this matter up actively.

We estimate 2,000 typhoid carriers in the State. We know the whereabouts of 66. In the last few years 12 have had gall bladder removals for cure of their carrier condition, and, incidentally, of gallstones which were found in each instance to be present. Five of these operations were at State expense in food handlers, either regular or intermittent. This whole matter is under review now by our staff. It is striking that in spite of all our intensive interest, in only 11 per cent of our cases could the source of infection be identified. This is evidence of the difficulty of tracing the sporadic cases which bulk so large in our current totals.

*Gonorrhea and Syphilis.* — There is still further increase in case reporting. The rates per 100,000 for gonorrhea were 1929, 104; 1930, 164; and 1931, 168. For syphilis they were 1929, 36; 1930, 99; and 1931, 104. Whether this is all improved reporting as a result of freer distribution of arsenicals, personal office conferences by one of our staff with over 2,000 physicians as Dr. Coombs did so effectively in Maine, frequent circularization of the profession with pertinent literature, and the like or whether a part of it is actual increased incidence of the diseases, who shall say. With diseases not more than 25 per cent reported to even double the reporting and say how much of the increase is apparent and how much real is as fascinating and futile as old wives' tales.

Many features of the problem are encouraging: the interest of the informed of the profession as evidenced by the organization of the Neisserian Medical Society of Massachusetts; the increased use of arsenicals which reached the record of 48,700 grams last year; the continued increase in smears and Wassermanns sent to us (yet Heaven knows why anyone treating gonorrhea should not do his own smears); the continuance of the splendid follow-up at the Lowell Clinic under the local Board of Health and the plans for improved clinic service under the Fall River Board of Health; our continued close cooperation with the educational, investigative and demonstrational program of the Massachusetts Society for Social Hygiene; the reports of lapsed cases from 148 communities where last year they were from 131; that only 90 towns in the State report no cases this year while in 1929 it was 258; and that even a few of the more thoughtful physicians are trying out social service follow-up on their private cases.

It is discouraging to find doctors using our arsenicals and diagnostic facilities without even reporting a single case. Prosecute! It is the law! That is one's first reaction. But as we well know such an approach merely stops the use of our facilities. A diagnosed and treated case unreported is better all around than no diagnosis and treatment at all. We hope this year to improve this situation through the well-known silken glove method.

*Lobar Pneumonia.* — Next to tuberculosis, lobar pneumonia is the most killing of our reportable diseases (in Massachusetts broncho pneumonia is not reportable). Types I and II, for which we have a concentrated anti-serum, constitute about half the deaths (1,000). If used in the first three, or possibly four, days of the disease the course of the disease can be shortened and at least one-half, or 500, of the lives can be saved. Up till now this serum has been available practically only in our Metropolitan hospitals. But on the average pneumonias do not reach these hospitals until the fifth day. We have then the phenomenon of a life-saving agent



available only at points where patients arrive too late to be benefited, and this is going on all over the country! Truly the great open spaces are above the ears.

Under a grant from the Commonwealth Fund of New York City as will be presented more at length later in this report, we plan to take this serum out into the smaller hospitals and homes of the State where it may be used in the effective first three days of the disease without loss of qualitative control of the service. It is admittedly tricky to decentralize and still maintain standards. Through selected local collaborators in nine centers representing all types of communities, through developing local typing laboratories, through improvement and extension of the costly production of the serum, and, most important, through the development of a pneumonia consciousness among the profession in the State, it is hoped to work out an economically practicable method of eventually making this service generally available to the entire State and save 500 lives annually and much time in sickness. Also from statistical and epidemiological studies we may learn something of control.

*Tuberculosis.* — With 4,421 cases of pulmonary tuberculosis reported and about 2,306 deaths (53.9 per 100,000) another low record for the State is made, though tuberculosis still remains the captain of the communicable disease men of death, and the captain of all the men of death, in the age group 15—39 years.

With our Chadwick Clinics examining 57,000 children annually in our schools, and our lavishly available city, county and state sanatoria beds (with Middlesex County Sanatorium open and Worcester in process of building we will have 1.7 beds per annual death), with the multiple local clinics supplemented under last year's legislation by county sanatoria staff, with the alertness after all these years of the medical profession and the public to the importance of early diagnosis, and with our active and discriminating state and county tuberculosis associations we should be in a fair way to felicitate ourselves in what has been accomplished. But when we see that less than 20 per cent of the more than 4,000 beds are occupied by early and favorable cases we see that most of the lavish wealth expended on our sanatoria is for little more than a gilt edging to the old-fashioned custodial care which Governor Butler made so infamous. Shame on us if we rest until at least 60 per cent, and preferably 80 per cent, of our beds are occupied by early cases so that we can shorten the average stay, reduce the readmissions, lessen the spread, and decrease the suffering and loss. To this end the Department is recommending to the Legislature that our present subsidy on hospitalized cases (amounting to \$360,000 this year) be allowed only to towns that in addition to using institutions approved by the State maintain a local diagnostic and follow-up service which complies with reasonable minimum standards to be prepared by this Department.

Our four sanatoria cared for 2,105 patients this year, divided as follows: Rutland, 651 adult pulmonary cases; North Reading and Westfield, 1,008 children with adult or childhood types of the disease; and Lakeville, 446 patients with non-pulmonary tuberculosis. In addition, 3,207 patients were seen in clinics by the institution staffs. In our Chadwick Clinics in the schools 57,412 children (8,731 in high schools) were examined and 31 were found to have the adult type of disease, 409 the juvenile type, and 165 were suspicious. In addition, 4,994 were examined by the Follow-up Clinic. This year we plan also to offer this examination to all those at the Normal Schools of the State since these young women are at a critical tuberculosis age and are a group in which educational work as to our tuberculosis program is vitally important.

Our five-year building program is now practically ended with the completion of an Employees' Building now under construction at Westfield. This year a new Medical and Surgical Building was opened at Rutland, as well as a Superintendent's House at Lakeville and at Westfield, allowing the superintendent's quarters at the former to be made over for staff quarters and at the latter for out-patient quarters long needed.

*Meningococcus Meningitis.* — Only 101 cases were reported this year as contrasted with 174 in 1930 and 167 in 1929. Thus the apprehended increase in this disease following its recent introduction into California from the Orient has not materialized and the diagnostic service available for the past two years through cooperation with the staff of the Children's Hospital has been discontinued. Any future calls for this service will be taken by our regular staff.

*Influenza.* — During January and February rumors of influenza, aided and

abetted by newspapers and their advertisers, made their seasonal appearance. A hasty survey of Westborough showed a definite increase in severe upper respiratory tract infections over what could be considered "normal." Consequently we organized for an emergency which fortunately did not materialize.

*Measles and Whooping Cough.* — Measles has been low. We have distributed a popular pamphlet stressing the danger of the complicating pneumonia, and 1,500 vials of sodium citrate to prevent clotting when parental blood is used as a preventive or palliative in the young or debilitated. For whooping cough, also showing the low figure of 7,147, we have in press a similar popular pamphlet similarly stressing the menace of pneumonia. Unfortunately we know of nothing else that we can soundly do in regard to this disease which is so disrupting to the school routine.

*Diphtheria.* — The sharp decline in this disease experienced in 1924-26 to a rate of 80 cases per 100,000, and which tended to stabilize through 1929 at rates between 90 and 100, has continued downward until this year with 2,381 cases reported we have a record case rate of 56. Our mortality rate of 3.0 is about 30 per cent lower than our previous record of 1930. The case fatality rate of 5.4 suggests a milder form of the disease. However, from the Middle West and South we hear, as the year ends, of increased prevalence. If this reaches us the effectiveness of various community immunization programs may be tested. We are preparing to collect data in such a way as to show the validity of the thesis of Godfrey of New York State that the proportion of immunizations among pre-school children determines the freedom of a community from diphtheria.

This year Springfield put on an admirable immunization campaign reaching 13,000. As the year closes we understand that Somerville, with the highest diphtheria death rate in 1929 of any of the northeastern cities, is putting on a large scale program. Only Everett, Malden and Taunton showed material increases in prevalence of this disease.

*Undulant Fever.* — Fifteen cases were reported this year as contrasted with 6 in 1930. Four hundred and nine human blood specimens were sent in for diagnosis and 9,397 specimens from cows. This suggests an increased interest in the disease among physicians and agriculturalists. However, there is little evidence to indicate that undulant fever here will approach the relatively high incidence which is being found in the Middle West.

*Biologic and Diagnostic Laboratories.* — Record distributions were made of Schick outfits and toxin-antitoxin mixtures. The distribution of tuberculin and sodium citrate is quite new and demand for them will undoubtedly grow. The pneumonia study is putting greater demands on and greater resources at the disposal of our laboratory and makes possible many very promising investigations.

Our Diagnostic Laboratories show a record demand for Wassermann, Kahn and Hinton tests and Agglutination tests for Undulant Fever (*Bacillus Abortus*) in cattle, as well as human blood for undulant fever, sputum for pneumococci type determination and tubercle bacilli and smears for gonococci. It is interesting how these increases reflect various programs of the Department.

### III. NON-COMMUNICABLE DISEASE

If, as has been said, the objective of a health department is to keep the well well, and that the proper interest in the sick should be limited to those aspects of sickness which threaten to make the well sick, it might be postulated that we should limit our activities in the field of the non-communicable diseases, which cannot be transmitted to the well, to novel and arresting methods of recapitulating wholesome and in general uninteresting phrases dealing with the verities of personal hygiene at all ages from minus nine months to the grave. But even though this might save us much time, money and worry as to the soundness of what we do, custom, the Legislature, and the shockingly growing burden of chronic sickness and the realization that much of the burden can be prevented or controlled will not tolerate the luxury of such inactivity.

*Maternal, Infant and Child Hygiene.* — At the end of the year we have 17,200 names on our mailing list for pre and post natal letters, including one to expectant fathers who certainly need education, contrasted with 12,000 last year. We have



been unable to work out a method of obtaining data on births sufficiently promptly to send out material but are glad to supply such to local boards of health that are interested. We have data on 214 locally conducted well child conferences, and our staff has conducted such conferences in 50 towns, including those in Franklin County where for the past four years we have attempted to work out the difficult problem of making such service self-perpetuating in highly rural areas. Summer Round-Ups of children about to enter school for the first time were conducted in 145 or 40 per cent of the communities representing 11 per cent of the population. Some 8,243 children are reported as examined, 25 per cent of these by their family physicians. We prepared a card suggesting such examination to parents and suitable for use by private physicians, and sent samples to all practitioners in the State. One reports having used them with satisfactory results. Sodom, it is recorded, would have been saved by one, so we are heartened. These 145 communities report that 4,000 defects were corrected. The Department helped in 52 other communities, but self-perpetuation is what we are striving for. In our school hygiene program we have offered teaching opportunities to various professional groups. On request we have surveyed the school health situation in seven communities and made resurveys with gratifying results in three. In cooperation with the Department of Education we have continued the three school hygiene conferences, the summer course at the Hyannis Normal School for teachers, nurses and dental hygienists (enrolment this year 63), and at the Fitchburg Normal School the nutritional courses for teachers. We are indeed fortunate at the close professional sympathy which exists between the Departments of Education and Public Health which is by no means universal over the country.

*Public Health Nursing.* — The reorganization of public health nursing within the Department has already been discussed. Through the generosity of the Rockefeller Foundation two of our nursing consultants were given the opportunity of six weeks post-graduate work at the East Harlem Nursing and Health Center in New York City. We are loud in recommending such stimulation to others, but, like the shoemaker's children, are in danger of neglecting our own staff. Since frequently the small organization finds difficulty in carrying on while one of its staff is away it may be well for us to look forward to expanding our staff so that one of our nurses can fill in in varying capacities while one of the local nurses is away taking some appropriate post-graduate work. Through cooperation with the State Tuberculosis League and the Massachusetts Society for Social Hygiene we assisted in three day institutes for public health nurses which were well attended in Boston, New Bedford, Northampton, and Worcester. For the second year we are assisting local nurses in taking the Extension Course sponsored by the New York University and the New York Department of Health (local enrolment this year 92) and we are considering with our Department of Education making such a course available through the Massachusetts Division of University Extension. A school nursing record has been devised which should stimulate quality of work and which has been well received. Mothers' classes and nursing clubs are showing increased interest and effectiveness. As already recorded, an advisory committee on public health nursing is helping us think straight in such problems as departmental reorganization, post-graduate education and integration with social service.

*Nutrition.* — Three nutritionists are continuing service in our tuberculosis clinics in the schools. Sixteen summer camps were visited and many others were corresponded with in regard to menus, food costs and the like. The value of such service at well child conferences and local chest clinics is being demonstrated. Summer courses at normal schools have already been referred to. A two year demonstration of nutritional programs by our staff has been completed at Natick and Wellesley and it is hoped that this service will be continued through local support. With the aid of our nutritional and dental hygiene advisory committees and particularly Dr. Percy Howe of the Forsyth Dental Infirmary we are instituting nutritional experiments at our sanatoria, the benefit of which we hope will be apparent in a few months through the teeth and also perhaps eventually through accelerated improvement of the tuberculous processes. In addition through consultation and lecture courses perhaps our most permanent influence in this field is made.

*Dental Hygiene.* — This year 130,155 children or 25 per cent of the elementary school population were reported as having received dental certificates. This is an increase of 30 per cent over last year. New or extended dental clinic service has been reported, till now such clinics number 230, of which 140 are under official and 90 under private auspices. We are giving dental hygiene service at the well child conferences conducted by the Department. Consultative service has been given to 122 communities in regard to instituting, extending or staffing dental hygiene programs.

*Education.* — Health education is principally carried on by the Divisions of Child and Adult Hygiene cooperatively. Nearly 3,000,000 pieces of printed matter were handled, or 30 per cent more than last year. There is a certain danger that when a pamphlet has once been prepared it will be reprinted uncritically until its value becomes more historical than factual. In the last few years all our printed matter has been revised and is now of a relatively high order in view of our present knowledge or ignorance in the many fields covered. The standing of this material is somewhat evidenced by the fact that requests for samples were received from 43 states and 17 jurisdictions outside the continental United States this year. For local Child Health Day and Summer Round-Up programs 855,000 pieces of printed material were sent out. The library (a chronically difficult problem with sharply limited space) has been reorganized. One hundred and forty-eight books were purchased and 98 subscriptions to current journals were made. Nine hundred lectures, 151 broadcasts, and 115 motion picture and delineascope showings were made. In addition exhibits and posters were used at various conventions and extensively in schools. Much of the exhibit material has been renewed and extended.

*Adult Hygiene.* — A survey of sickness among 75,000 persons in 49 widely diversified and representative communities over the State has been completed and is being worked up. It will give data on the prevalence of chronic sickness among adults, its economic and industrial distribution, the incapacity and lost time, the resources for these diseases and their utilization and many other pertinent medical, economic and social facts such as have nowhere previously been available. Five years ago when organizing our cancer program such data would have been invaluable. Last year we directed attention to the fact that there were at any one time in Massachusetts 150,000 cases roughly classified as rheumatism; that while reports from well-ordered clinics indicated that 70 per cent could be benefited we found that 70 per cent in Massachusetts were receiving no medical attention; and the like. We suggested for medical, social and economic reasons the institution of a program for rheumatism. This, probably wisely, received little attention. For the time at least we have left rheumatism to Sisyphus or anyone else who may have the courage and statesmanship to handle it, since we find that cancer needs all the attention that we have to give.

*Cancer.* — With 115 beds at our Pondville Hospital for cancer we were shocked to find that the waiting list remained almost constantly between 40 and 85. With time the essence of success against cancer this was an intolerable situation. A survey of 86 general hospitals through the State showed that 46 per cent more cancer was being handled by these hospitals than five years ago. In other words, whatever the shortcomings of the campaign, the people with cancer were coming forward for treatment in unprecedented numbers, which is half the battle, for the best service in the world is sterile unless utilized. But how early they are coming and how adequately they are being treated remain for us to discover. Thus we are asking in this year of depression for an appropriation for 50 more beds, expanded surgical resources and staff quarters at the Pondville Hospital. Are we ashamed of further burdening the oppressed tax payers in this way? No! It was the Legislature, i.e., the people, who ordered a cancer program. It is therefore their responsibility to provide the means. The sooner the Legislature realizes that poor service is the most costly and that adequate service is expensive, the sooner we will get out of some of our half-baked health and medical dilemmas. About 3,000 persons came to the state-aided clinics in 15 different communities. This is about 20 per cent increase over last year, though the number with cancer is about the same (636 in 1930 and 684 in 1931). This may mean that the residuum of advanced cancer throughout the State has been largely drained off during the past five years and



that we are now getting for the most part the new cancer as it occurs; or that the appeal of our clinics is waning; or that cancer is more readily going to private offices than to clinics (we have already found that it shows such preference in the proportion of 11 to 1); or it may mean, as we devoutly hope, that it is arriving at the clinics earlier in the disease. Special cancer clinic days were held in Brockton, Fitchburg, Lawrence, Pittsfield and Worcester for all local physicians and were attended by such distinguished out-of-state visitors as Dr. Burton Lee, Dr. C. C. Little and Dr. Francis Carter Wood, as well as by local men of wide experience with cancer. Surely the medical profession of Massachusetts is rubbing shoulders with quality in the cancer field as would never have been the case without the State cancer program.

*Pondville Hospital.* — There were 907 hospital admissions this year and 1,755 were served in the clinics. For every one dying in the hospital there were 2.43 leaving alive. This figure was formerly 1 to 3, but will presumably continue to go down as our proportion of readmissions goes up. Again we ask how high a death rate can Pondville carry without jeopardizing its usefulness. Many an excellent institution has had its reputation ruined by its death rate. We obtained autopsies on 43 per cent of our cases, the value of which has been enormously increased by a resident pathologist who is giving valuable supplementary service at our Lakeville State Sanatorium. The Pondville Hospital is giving service of an unprecedentedly high order. Our visiting staff, expanded to 19, gives over 300 hours per month. We have a medical superintendent and five medical residents and we need another even before we get more beds, an excellent school for the purpose of training our own attendants, two resident medical social workers and we need a third with the rapid overturn and burden of follow-up, and we are getting an historian to be responsible for the completeness of records. This year there was published a review of all admissions during the first two years.\* This is an incomparably wholesome practice and periodically will be repeated. We have felt that the time was too short to yet expect to see any effect of our whole program on the cancer death rate. How long can we use this placebo?

*White House Conference on Child Health and Protection.* — Last spring Governor Ely appointed a Massachusetts Committee for the White House Conference on Child Health and Protection, realizing that if the children of the State were to benefit from the Conference, the findings must be presented to responsible, interested people in each and all of our communities. We have loaned certain personnel from the Department to the Committee for a year. A speakers' bureau of some 150 persons, each informed on one of the four sections of the Conference, has been organized. In the fall two-day institutes were held in Boston and in Springfield and were attended by 700 persons. One hundred and sixty groups have been addressed already or arranged for in the future. Further requests are being stimulated. A monthly bulletin has kept a wide group informed. A steering committee is guiding progress and helping us see where the whole matter will be left when our year is up next June. We are inviting the widest possible cooperation.

#### IV. ENVIRONMENTAL CONTROL

A typhoid death rate of 0.70 per 100,000 of the population, the lowest that this State or perhaps any state has ever known, a figure not long ago thought to be impossible for any but a few beneficently situated cities, might presumably answer the question of the sanitary adequacy of environmental control in Massachusetts. But while, as with other problems, we may be grateful, there is certainly no cause for complacency. The heel still occupies far too much of Achilles' anatomy! A low typhoid rate is obtained and maintained only by constant vigil. Remove the vigil and see what will happen. The depression is affecting local as well as state engineering budgets. That means that our supervision of public water supplies (serving 97 per cent of the population) and sewage disposal works must be intensified. We will withdraw as far as practical from other engineering activities and concentrate on these cardinal matters.

The termination of the drought followed by a somewhat excessive rainfall, together with decreased industrial activities resulted in relatively satisfactory con-

\*American Journal of Cancer, July, 1931, Vol. XV, No. 3.

ditions in ponds and streams throughout the State. However, the 607 applications for advice make a high point, 6 per cent over 1930. The four legislative investigations have thrown a heavy burden on our engineering staff and laboratories which was admirably carried.

The supervision of shellfish chlorinating plants has raised many vexing scientific, administrative, and commercial problems which have all the elements needed for profound misunderstanding between the "practical" and "scientific" factors involved and call for no small degree of statesmanship to decide wisely between the interests of the producer and the consumer. How happy must have been the primitive days (with high typhoid rates) when every consumer was his own producer. It is apparently an inalienable right to give anyone typhoid other than for gain. The problems of the Reclamation Board and its unemployment program have also taken much of the time and energy of certain of our staff.

As part of our program of recreation sanitation we visited 726 wayside stands, overnight camps, and tourists homes. The astonishing and gratifying result was the generally satisfactory condition of these places. As with the summer camps, the patronizing public is apparently sufficiently critical to force reasonable standards of decency. The surprising thing is, however, that the Queen Anne front which the public sees and demands is so generally accompanied by a Queen Anne, rather than a Mary Ann, back which the public less generally sees and which one would perhaps suppose would be of little interest. Such sanitary abominations as were found have been in general corrected voluntarily or with pressure from the local board of health involved, and we conclude, fortunately, that no new authority vested in the State is needed in this regard. Next summer we had hoped to take up the vexing and neglected problem of bathing loads at swimming resorts, but owing to budget curtailment this will apparently have to be deferred. To be intelligent and effective in the problem of recreation sanitation is, as we look over the practices in the country, apparently not easy.

Rather interestingly in two cases of gas poisoning, in Cambridge and in Holyoke, our laboratory was able to give prompt service and confirm the suspicion of carbon monoxide. In the former instance poisoning occurred in a shallow dry well, so called, a possible source of the lethal gas being a running automobile engine, and in the latter in a house, the windows of which must have been consistently closed, built over made land in which there was a smouldering fire.

Our bacteriological examinations of milk before and after pasteurization show, in general, a consistent improvement in the product. This year we found fewer instances of adulteration of milk with water than ever before. We are hoping for much from the legislative committee studying principally the complex problem of supervision of milk production. We have added an inspector to our staff who shall assist in the grave responsibility of supervision of pasteurizing plants by the Department.

Again the Department is brought to public attention, through attempted outside interference in proper reporting of analyses of samples of liquor for the purpose of prosecution. This and matters to do with the prevention of fraud rather than the menace to health which the law places on us, we are asking a legislative committee to review. If, as in two-thirds of the other states, our burden of inappropriate misunderstanding and irritation could be taken from us our progress in more appropriate fields would be less handicapped.

## V. PERSONNEL

The organization of the Public Health Council has not changed during the past year, the Governor having reappointed Dr. Ryan and Mr. Hutchins at the expiration of their terms.

In January Mr. Lewis I. Nurenberg died. Mr. Nurenberg had been in the employ of the Department as a chemist in the Division of Food and Drugs since 1906, and held the position of Chief of Laboratory at the time of his death. His position was filled by the promotion of Mr. Carl S. Ferguson.

Following the grouping of certain towns into the Southern Berkshire Health Unit, Dr. Frederick S. Leeder resigned as District Health Officer of the Berkshire District to become Health Officer of the unit on February first. Dr. Leeder main-

tains his contact with the Department through an appointment as part-time Epidemiologist.

On April first Dr. G. Fletcher Reeves was appointed as Health Officer by the Nashoba Associated Boards of Health, and was at the same time given an appointment as part-time Epidemiologist in order that he, too, might attend Department staff meetings, and be on call for emergency service for the Department.

Dr. Walter W. Lee, formerly a State District Health Officer in Connecticut, was appointed on March first as District Health Officer of the Berkshire District.

Dr. Benedict Ramin was appointed Child Welfare Physician in the Chadwick Clinics on April 20, 1931, to fill the vacancy caused by the resignation of Dr. Hubert A. Boyle.

On May fifteenth Dr. Clarence L. Scamman resigned as Deputy Commissioner and Director of the Division of Communicable Diseases in order to join the staff of the Commonwealth Fund of New York City. Dr. Gaylord W. Anderson, Assistant Director, was appointed as Director of the Division of Communicable Diseases and Deputy Commissioner. On July first Dr. Roy F. Feemster was appointed as Epidemiologist and later, on November first, after becoming familiar with the Department activities, he was promoted to the position of Assistant Director of the Division.

On May sixteenth Dr. Nels A. Nelson was promoted to the rating of Assistant Director of the Division of Communicable Diseases, in charge of the control of gonorrhea and syphilis.

Because of the unusual number of infantile paralysis cases Dr. Harold S. Stevens was appointed on August 14, 1931, as a temporary Epidemiologist. On October 14, 1931, this appointment was made permanent to fill the vacancy caused by the resignation in September of Dr. Ralph E. Wheeler.

With the enlargement of the program of the Public Health Nursing Supervisors of the Division of Child Hygiene, it was decided to reduce the number of towns in each section and add to the staff. On October 13, 1931, Miss Aura E. Kepler was appointed and a reassignment of the communities under the supervision of the Nursing Supervisors is in progress.

In May Mrs. Esther Erickson Baldwin resigned as Public Health Nutrition Supervisor. Miss Mary Spalding was appointed to fill this vacancy in October.

VI. ORGANIZATION

The organization of the Department is as follows:

Commissioner of Public Health . . . . .	1
Public Health Council . . . . .	6
Division of Administration:	
Secretary (1), Epidemiological Consultant (1), Clerks and Stenographers (11) . . . . .	13
Division of Adult Hygiene:	
Herbert L. Lombard, M.D., Director.	
Epidemiologists (2), Social Workers (2), Public Health Education Workers (2), Field Epidemiologist (1), Clerks and Stenographers (17) . . . . .	25
Division of Biologic Laboratories:	
Benjamin White, Director.	
Assistant Director (1), Chemists and Bacteriologists (8), Laboratory Technician (1), Laboratory Assistants (2), Laboratory Helpers (8), Stable Foreman (1), Laborers (15), Janitors (2), Clerks and Stenographers (6).	
(Wassermann Laboratory):	
Chief of Laboratory (1), Bacteriologist (1), Laboratory Technician (1), Laboratory Assistant (1), Laboratory Helpers (4), Clerks and Stenographers (3) . . . . .	56
Division of Communicable Diseases:	
Gaylord W. Anderson, M.D., Director and Deputy Commissioner.	
Assistant Director (1), District Health Officers (7), Epidemiologists (4), Clerks and Stenographers (8).	
(Diagnostic Laboratory):	
Bacteriologists (4), Laboratory Technician (1), Laboratory Helper (1), Laborer (1), Clerks (2).	



P.D. 34.	15
(Venereal Diseases):	
Assistant Director (1), Epidemiologist (1), Public Health Social Hygiene Supervisor (1), Public Health Education Worker (1), Clerks and Stenographers (2)	36
Division of Food and Drugs:	
Hermann C. Lythgoe, Director.	
Chief of Laboratory (1), Chemists and Bacteriologist (5), Veterinary Inspectors (3), Food Inspectors (6), Laboratory Helpers (2), Laborers (2), Clerks and Stenographers (8)	28
Division of Child Hygiene:	
M. Luise Diez, M.D., Director.	
Child Welfare Physician (1), Head Supervisor Public Health Nursing (1), Public Health Dental Hygiene Supervisor (1), Public Health Nutrition Workers (3), Public Health Education Workers (2), Clerks and Stenographers (8).	
(Maternal and Child Hygiene):	
Child Welfare Physician (1), Public Health Nursing Supervisors (5), Clerks and Stenographers (6)	29
Division of Sanitary Engineering:	
Arthur D. Weston, Chief Sanitary Engineer:	
Engineers and Engineering Assistants (14), Clerks and Stenographers (12)	27
Division of Tuberculosis:	
Alton S. Pope, M.D., Director.	
Assistant Director (1), Epidemiologist (1), Superintendent of Sanatoria Construction (1), Inspector of Settlements and Support Claims (1), Social Workers (2), Field Nurse (1), Clerks and Stenographers (9).	
(Tuberculosis Clinics):	
Supervisors of Tuberculosis Clinics (2) Child Welfare Physicians (5), Field Nurses (4), Public Health Nutrition Workers (3), X-ray Clinic Field Agents (2), Clerks and Stenographers (9)	42
Division of Water and Sewage Laboratories:	
Harry W. Clark, Director.	
Chief of Laboratory (1), Chemists and Bacteriologists (10), Laboratory Assistant (1), Mechanical Handyman (1), Laborer (1), Watchman (1), Clerks and Stenographers (3)	19
Total	282
The average number of employees at each of the institutions under the supervision of the Department is as follows:	
Lakeville State Sanatorium	174
North Reading State Sanatorium	150
Rutland State Sanatorium	203
Westfield State Sanatorium	139
Pondville Hospital	115
	781
Grand Total for the Department	1,063

VII. PUBLICATIONS

The following articles by members of the staff have been published:

Division of Administration

Chronic Rheumatism in Massachusetts  
 Dr. George H. Bigelow and Dr. Herbert L. Lombard  
 New England Journal of Medicine, 203: 1232-1233, December 18, 1930

Our Falling Birth Rate  
 Dr. George H. Bigelow and Angeline Hamblen  
 New England Journal of Medicine, 204: 209-211, January 29, 1931



## Massachusetts Cancer Program

Dr. George H. Bigelow

American Journal of Cancer, 15: 284-285, January, 1931

## Eighth New England Health Institute

Dr. George H. Bigelow

New England Journal of Medicine, 204: 248-250, February 5, 1931

## Serum Treatment of Pneumonia

Dr. George H. Bigelow

New England Journal of Medicine, 205: 242-248, July 30, 1931

*Division of Adult Hygiene*

## State-Aided Cancer Clinics in Massachusetts

Dr. Herbert L. Lombard

Surgery, Gynecology and Obstetrics, LII, February, 1931

## What Social Work Is Not

Eleanor E. Kelly

American Journal of Public Health, XXI, 8, August, 1931

## Public Health and Chronic Disease

Dr. Herbert L. Lombard

Trained Nurse and Hospital Review, November, 1931

## State-Aided Cancer Clinics as Seen by the Practicing Physician

Dr. Herbert L. Lombard and Eleanor J. Macdonald

New England Journal of Medicine, 205: 20, November, 1931

## Experience with Public Health Social Work

Eleanor E. Kelly

Hospital Social Service, XXIII, 1931

## Complete Records Aid Control of Cancer

Dr. Herbert L. Lombard and Eleanor J. Macdonald

Public Health Nursing, XXIII, November, 1931

## Future of Public Health

Dr. Herbert L. Lombard and Eleanor J. Macdonald

Courier of the I.C.F.N., III, November, 1931

*Division of Biologic Laboratories*

## The Action of Formaldehyde on Diphtheria Toxin

William E. Bunney

Journal Immunology, XX, 1: 47, January, 1931

## Advantages and Disadvantages of the Buffered Diluent for Diphtheria Toxin

William E. Bunney and Dr. Benjamin White

Journal Immunology, XX, 1: 61, January, 1931

## A New Diluent for Diphtheria Toxin in the Schick Test

William E. Bunney

Journal Immunology, XX, 1: 71, January, 1931

## A Study of the Acid Precipitation of Diphtheria Toxin

William E. Bunney, J. Cianciarulo and Mumtaz Kiamil

Journal Immunology, XX, 6: 417, June, 1931

## The Speed of Flocculation of Diphtheria Toxin

William E. Bunney and Mumtaz Kiamil

Journal Immunology, XX, 6: 433, June, 1931

*Division of Child Hygiene*

## What Price Health

Dr. Fredrika Moore

Understanding the Child, October, 1931

*Division of Communicable Diseases*

## Psittacosis

Dr. Gaylord W. Anderson

New England Journal of Medicine, 204, 2: 67-68, January 8, 1931

## Minimum Standards for the Diagnosis, Treatment and Control of Gonorrhea

Dr. Nels A. Nelson

New England Journal of Medicine, 204, 9: 424-430, February 26, 1931

- Health and Summer Camps in Massachusetts in 1930  
 Dr. Gaylord W. Anderson, Arthur D. Weston and Seiriol L. Williams  
 The Camping Magazine, March, 1931
- Gonorrhea and Syphilis in Massachusetts in 1930  
 Dr. Nels A. Nelson and Dr. Clarence L. Scamman  
 New England Journal of Medicine, 204, 13: 637-641, March 26, 1931
- Meningococcal Meningitis—Report of a Year of Consultative Service  
 Dr. R. Cannon Eley  
 New England Journal of Medicine, 204: 914-916, April 30, 1931
- Epidemic Meningitis in Indianapolis, 1929-1930  
 Dr. Walter W. Lee  
 Journal of Preventive Medicine, 5: 203-209, May, 1931
- Diphtheria Immunization in Philadelphia and New York City  
 Dr. Walter W. Lee  
 Journal of Preventive Medicine, 5: 211-220, May, 1931
- Health Service for the Small Community, Its Development in Massachusetts  
 Dr. Clarence L. Scamman and Dr. Wilson W. Knowlton  
 New England Journal of Medicine, 204, 23: 1184-1187, June 4, 1931

*Division of Tuberculosis*

- The Pondville Hospital  
 Dr. Ernest M. Daland  
 Journal of Surgery, Gynecology and Obstetrics, February 15, 1931
- Serum-Calcium in Pulmonary Tuberculosis  
 Dr. Jacob Kaminsky and Doris L. Davidson  
 American Review of Tuberculosis, April, 1931
- Oleothorax  
 Dr. Paul Dufault  
 American Review of Tuberculosis, June, 1931
- An Analysis of Cases at the Pondville Hospital (Massachusetts State Cancer Hospital) during Its First Two Years  
 Staff of the Pondville Hospital  
 American Journal of Cancer, Supplement to July, 1931
- What We Have Learned in Massachusetts from the Ten-Year Program  
 Dr. David Zacks  
 New England Journal of Medicine, 205: 525-533, September 10, 1931
- A Study of Twenty Cases of Sacro-iliac Tuberculosis at the Lakeville State Sanatorium  
 Dr. George L. Parker  
 New England Journal of Medicine, 205: 573-577, September 17, 1931
- The Discovery and Prevention of Tuberculosis in the Community  
 Dr. Alton S. Pope  
 Journal of the American Medical Association, 97: 846-849, September 19, 1931
- Kymographic Tracings in Artificial Pneumothorax  
 Dr. Paul Dufault  
 American Review of Tuberculosis, September, 1931
- Simultaneous Bilateral Artificial Pneumothorax  
 Dr. Jacob Kaminsky  
 American Review of Tuberculosis, September, 1931
- The Effect of Viosterol on Calcification in Tuberculosis  
 Dr. Jacob Kaminsky and Doris L. Davidson  
 American Review of Tuberculosis, October, 1931
- Plastic Reconstruction of the Lower Lip  
 Dr. Ernest M. Daland  
 New England Journal of Medicine, 205: 1131-1142, December 10, 1931
- Lymphogranulomatosa d. Knochen  
 Dr. Richard Dresser  
 Strahlentherapie, 41

*Division of Sanitary Engineering*

- Mosquito Control  
 Edward Wright  
 Journal of Boston Society of Civil Engineers, November, 1931

## VIII. LEGISLATION

The Department is submitting the following proposed legislation:

*Relative to Subsidies to Cities and Towns for Pulmonary Tuberculosis Cases*

At present the State pays five dollars a week to cities and towns for every case of tuberculosis in an institution approved by the State Department of Public Health. We now ask that such payments should also depend upon an adequate tuberculosis prevention program in the city or town receiving this subsidy.

Under this bill the money which the Commonwealth now pays would be spent more effectively. The Department of Public Health would secure the advice and assistance of a group of impartial men, not connected with state or county tuberculosis sanatoria but familiar with institutional administration, to draw up minimum standards with which cities and towns would have to comply in order to secure the subsidy. Standards would be entirely "reasonable," time would be allowed, and all possible advice and assistance would be given to local communities in developing an adequate tuberculosis service. The object of the bill is that money spent should be spent more effectively. Its primary purpose is not to control expenditures but to control tuberculosis.

Massachusetts now has more adequate tuberculosis hospital facilities per unit of population than any other state in the Union. With the recent opening of the Middlesex County Hospital and the opening of the Worcester County Hospital next year there will be 4,200 beds in city, county, state and private hospitals for pulmonary tuberculosis, while in 1930 there were 2,423 pulmonary deaths. This gives a ratio of 1.7 beds for every annual death from pulmonary tuberculosis. This represents an annual maintenance cost of at least \$4,000,000 without any consideration of the many thousands in initial construction cost for each bed. Add to all this the cost of private medical, clinic, and nursing care, as well as lost employment, public and private dependency and poverty, and we see that in Massachusetts the annual cost of tuberculosis is in figures which we still associate with Liberty Loans and other emergencies.

But the worst feature is that these lavish hospital resources are being grossly misused. Less than 20 per cent of the patients enter these hospitals in an early and favorable stage of the disease, while as a reasonable minimum 60 per cent should so enter. What does this mean? First, the chance of life and return to independent gainful employment is enormously reduced. Second, the duration of stay in hospitals and therefore the cost per patient is greatly increased. Third, and perhaps most important, the number of patients with positive sputum spreading the disease for long periods before detection and subsequent hospitalization, is vastly more widespread than it should be. Thus, through infection of children, fellow workers, casual contacts on street and street cars, at meetings, concerts, crowdings of all sorts, perhaps through our most intimate friends, especially through close contact in the homes, tuberculosis is striving successfully for immortality.

Adequate resources for early case finding and competent follow-up of the cases leaving the hospitals, that the shockingly costly burden of "repeaters" may be diminished, is within the power of every city and town in the State today. Yet still we have communities that report more deaths than cases of tuberculosis (think of it!); others that almost never hospitalize until death is imminent and spread has been accomplished; many more with no thought of offering decent supervision to the ex-hospital patient to prevent or early to detect relapse. In some places there is not even wholesome dissatisfaction with these conditions. Surely if they cannot be improved we can stop the irony of paying State moneys to perpetuate such futility.

*Relative to an Investigation of Pure Food Legislation and its Enforcement*

In Massachusetts the enforcement of the food and drug and allied laws is vested in the State Department of Public Health. In about two-thirds of the other states this is not the case. Most of this work has to do with the prevention of fraud and the control of the unæsthetic. However, this does not apply to the supervision of milk and shellfish which have repeatedly spread disease. Certain aspects of their supervision should be maintained in the Department of Public Health. But second-hand material in mattresses, cane sugar in maple sugar, watering vinegar, palatable cold storage eggs for "fresh" eggs, liquor analyses for the police, excess of



corn meal in sausages, what have all these to do directly with the public health? People pay for one thing and get another. It is fraud, not health.

Yet of all the widely diversified activities of the Department these give rise to more time-consuming petty interference than all others combined. Also, and this is most important, they give rise to irritation and resentments which block progress in other important fields. Indignation is general, not specific, and is long lived. This is meant as no reflection on the Director of the Division of Food and Drugs in the Department. The criticisms are evidence of his unswerving integrity under the law. In addition, he is a chemist of high reputation. He would be difficult to duplicate in this field.

Thus we ask that a committee be appointed by the Legislature and the Governor to investigate the food and drug laws and their administration. Are we inept in our administration? Do our present laws set up unwise standards or requirements? Or are those states right, as we think, which have for the most part the administration of these laws elsewhere than in the health department?

#### *Relative to Polluted Shellfish*

At present anyone delivering polluted shellfish can avoid conviction by claiming that such shellfish came from areas not designated by the Department of Public Health as contaminated or that such shellfish had passed a shellfish treatment plant. Unless we have been present at the digging and followed them all the way since, we cannot effectively disprove this. Thus protection of the public is nullified.

Our experience under this act is even worse than we suspected and we therefore ask that it be repealed in order that the public may be protected from the menace of consuming polluted shellfish.

### IX. FINANCIAL STATEMENT

#### *Appropriations and Expenditures for the Year ended November 30, 1931*

	Appropriations Plus Amounts Brought Forward.	Expenditures. to November 30
Division of Administration . . . . .	\$43,727.54	\$40,802.58
Division of Adult Hygiene . . . . .	86,306.47	84,642.93
Division of Child Hygiene . . . . .	60,933.70	57,191.51
Maternal and Child Hygiene . . . . .	36,746.95	32,195.09
Division of Communicable Diseases . . . . .	95,139.10	92,704.26
Venereal Diseases . . . . .	46,066.59	43,273.75
Division of Food and Drugs . . . . .	68,242.62	63,716.64
Administration of Shellfish Law . . . . .	4,170.00	3,964.27
Division of Biologic Laboratories:		
Antitoxin and Vaccine . . . . .	113,519.00	113,451.02
Wassermann Laboratory . . . . .	21,813.34	21,805.10
Division of Sanitary Engineering . . . . .	93,358.69	91,505.49
Division of Water and Sewage Laboratories . . . . .	52,000.00	51,308.32
Division of Tuberculosis . . . . .	51,450.60	51,116.82
Subsidies to Cities and Towns . . . . .	281,000.00	280,514.20
Tuberculosis Clinic Units . . . . .	95,726.62	86,948.00

\$1,150,201.22 \$1,115,139.98

#### *Special Appropriations and Expenditures for the Year ended Nov. 30, 1931.*

	Balance of 1930 Appropriation	Expenditures to Nov. 30
Investigation Coastal Waters of Barnstable, Dukes and Nantucket Counties, Chapter 312, Acts 1929 . . . . .	\$1,460.37	\$254.34
	Appropriations	
Charles River Improvement, Chapter 20, Res. 1931 . . . . .	\$7,500.00	\$7,499.60
Charles River Valley Sewer Investigation, Chapter 40, Res. 1931 . . . . .	5,000.00	4,344.92
Ware and Quinapoxet Rivers Investigation, Chapter 66, Res. 1931 . . . . .	2,000.00	1,995.99
Infantile Paralysis . . . . .	10,000.00	9,974.33
Experiment Station Fire . . . . .	3,000.00	959.42

\$28,960.37 \$25,028.60

#### *State Sanatoria*

#### *Appropriations and Expenditures for the Year ended November 30, 1931.*

	Total Appropriations Brought Forward	Expenditures to Nov. 30, 1931
Lakeville State Sanatorium . . . . .	\$207,791.83	\$283,142.82
North Reading State Sanatorium . . . . .	253,767.68	243,280.46
Pondville Hospital . . . . .	246,326.67	225,735.54
Rutland State Sanatorium . . . . .	350,280.07	325,280.63
Westfield State Sanatorium . . . . .	268,721.93	251,351.35



## Special Appropriations

	Total Appropriations	Expenditures to Nov. 30, 1931
<i>Lakeville:</i>		
Acts 1930, Chap. 115, Item 633, "New Water Supply" . . . . .	\$6,800.00	\$6,005.91
Acts 1929, Chap. 146, Item 587 . . . . .	8,700.00	
Acts 1930, Chap. 115, Item 632, "Additions to Fire Protection" . . . . .	9,000.00	17,201.02
Acts 1929, Chap. 146, Item 588, "Children's Building" . . . . .	132,500.00	132,466.95
Acts 1930, Chap. 115, Item 629, "Superintendent's House" . . . . .	21,000.00	20,877.68
Acts 1930, Chap. 115, Item 630, "Alterations on Administration Building" . . . . .	13,000.00	11,753.72
Acts 1931, Chap. 1, Item S, "Alterations of Two Buildings" . . . . .	17,000.00	14,721.81
Acts 1930, Chap. 115, Item 631, "Furnishings and Equipment on Children's Building" . . . . .	10,000.00	9,919.97
Acts 1931, Chap. 1, Item T, "Repairs and Improvements" . . . . .	5,700.00	4,921.73
<i>North Reading:</i>		
Acts 1930, Chap. 115, Item 638, "Addition to Nurses' Home" . . . . .	20,000.00	19,882.12
Acts 1930, Chap. 115, Item 639, "Employees' Building" . . . . .	75,000.00	68,831.33
Acts 1929, Chap. 146, Item 591 . . . . .	19,000.00	
Acts 1930, Chap. 115, Item 635, "Power House Alterations" . . . . .	21,000.00	39,999.71
Acts 1929, Chap. 146, Item 592 . . . . .	21,000.00	
Acts 1930, Chap. 115, Item 636 . . . . .	16,000.00	
Acts 1931, Chap. 245, Item 569, "Improving Water Supply and Fire Protection" . . . . .	5,700.00	40,748.15
Acts 1930, Chap. 115, Item 637, "Addition to Dining Room" . . . . .	4,000.00	3,986.43
Acts 1929, Chap. 146, Item 590, "Admission and Isolation Building" . . . . .	172,000.00	169,097.22
Acts 1931, Chap. 1, Item U, "Repairs and Improvements" . . . . .	8,600.00	8,599.57
<i>Pondville:</i>		
Acts 1929, Chap. 146, Item 598 . . . . .	\$78,000.00	
Acts 1930, Chap. 115, Item 651, "Hospital Unit and Out-Patient Department and Furnishings for Same" . . . . .	31,500.00	\$109,140.69
Acts 1928, Chap. 127, Item 603 . . . . .	14,000.00	
Acts 1929, Chap. 146, Item 599 . . . . .	2,500.00	16,980.89
Acts 1930, Chap. 115, Item 653, "Additional Fire Protection" . . . . .	500.00	
Acts 1929, Chap. 146, Item 600, "Improvements to Sewer Beds" . . . . .	1,200.00	1,187.88
Acts 1930, Chap. 115, Item 652, "Recreation Building" . . . . .	7,000.00	5,693.39
Acts 1931, Chap. 245, Item 577a, "New Filter Beds" . . . . .	10,000.00	246.65
<i>Rutland:</i>		
Acts 1929, Chap. 146, Item 594, "Water Supply and Sprinkler Heads" . . . . .	15,000.00	14,817.24
Acts 1930, Chap. 115, Item 643, "Hay Barn, Garage and Equipment" . . . . .	22,000.00	21,723.52
Acts 1930, Chap. 115, Item 641, "Medical and Surgical Building" . . . . .	35,000.00	33,933.59
Acts 1930, Chap. 115, Item 642, "Lightning Protection" . . . . .	6,000.00	5,014.16
Acts 1931, Chap. 268, Item 571a, "Cow Barn" . . . . .	25,000.00	21,509.90
Acts 1931, Chap. 245, Item 573, "Electrical Equipment" . . . . .	7,000.00	849.25
<i>Westfield:</i>		
Acts 1929, Chap. 146, Item 596 . . . . .	10,700.00	
Acts 1930, Chap. 115, Item 645 . . . . .	6,200.00	20,538.72
Acts 1931, Chap. 245, Item 575, "Water Supply and Fire Protection" . . . . .	5,000.00	
Acts 1930, Chap. 115, Item 647, "Farm House Alterations" . . . . .	9,000.00	8,612.15
Acts 1930, Chap. 115, Item 648, "Children's Building Alterations" . . . . .	11,000.00	10,912.01
Acts 1930, Chapter 115, Item 649, "Administration Building Alterations" . . . . .	3,800.00	3,154.14
Acts 1930, Chap. 115, Item 646, "Superintendent's Residence" . . . . .	21,000.00	20,670.08
Acts 1931, Chap. 1, Item V, "Clearing Land" . . . . .	6,000.00	5,970.34
Acts 1931, Chap. 245, Item 575a, "Dormitory for Employees" . . . . .	79,500.00	14,697.33
Acts 1931, Chap. 245, Item 576, "X-ray and Other Equipment" . . . . .	6,000.00	463.48
Acts 1931, Chap. 245, Item 576a, "Additional Sewage Disposal" . . . . .	5,000.00	4,966.85

## Receipts

	Amount
License Fees, etc. . . . .	\$2,392.47
Lakeville State Sanatorium . . . . .	116,352.09
North Reading State Sanatorium . . . . .	73,226.93
Rutland State Sanatorium . . . . .	259,253.67
Westfield State Sanatorium . . . . .	74,441.78
Pondville Hospital . . . . .	54,315.94

GEORGE H. BIGELOW, M.D.,  
Commissioner of Public Health.

## REPORT OF DIVISION OF ADULT HYGIENE

HERBERT L. LOMBARD, M.D., *Director*

The Division of Adult Hygiene has continued during the present year the policies previously established.

## SURVEYS

In January a survey was conducted in Westborough to determine the possibility of an influenza epidemic in the State. The results indicated a possible epidemic and the Department prepared to meet any emergency. No epidemic occurred.

During May, June, July, August, September, and October the three-year chronic disease survey was finished. The complete study gives us over 75,000 records collected in forty-nine cities and towns throughout the State. This study has been conducted to determine the volume of chronic illness in Massachusetts, the methods of care and treatment for these diseases, and such causal factors as could be obtained.

Five years ago data on cancer was collected from ninety-one hospitals throughout the State. This year eighty-six of these were revisited and information comparable to that previously obtained was collected. This year rheumatism and pneumonia records were copied in addition to the cancer records.

## CONFERENCES

A conference of the cancer clinic chiefs was held on April 24, 1931, at the Pondville Hospital. On the same day there was a conference of the cancer clinic social workers at the Hospital.

The second conference of the social workers was held in Boston on November 4th. At these conferences clinic policies were discussed.

## STUDIES

The following studies were conducted during the year:

1. Cambridge Survey: completed and published.
2. Brockton Old Age: completed.
3. Visiting Nurses' Questionnaires: completed and published.
4. State-Aided Cancer Clinics as Seen by the Practicing Physicians: completed and published.
5. Chronic Disease Survey: being analyzed.
6. History of Massachusetts Cancer Program: nearly completed.
7. Cancer Data on Increase, Duration, etc.: being revised.
8. Five-Year Estimate of Social Service Activities: data being collected.

## EDUCATION

During the year the educational work has continued to expand.

The Division had a health exhibit at the Annual Convention of the State Federation of Women's Clubs held at Swampscott in May.

The Division also had an active part in the Massachusetts Conference of Social Work held at Swampscott in September.

Arrangements were made, in cooperation with the Division of University Extension, to give a course on Healthy Living. Adult Hygiene made out the program and attended to the details of this course.

More than 7,400 inches of newspaper publicity have been received from the clipping bureau for nine months, as we received no clippings for June, July or August. This figure also includes the Health Forum.

It is estimated that about 125,000 pieces of literature have been distributed. There have been about 103 lectures given at which approximately 7,400 persons attended. The Lewis and Canti films and "By the Way" have been shown forty-six times to about 1,750 people.

Cancer Danger Signal Posters have been placed in 338 railroad stations throughout the State.

Through cooperation with the Division of Public Libraries several books on health have been placed in thirty-nine libraries in the State.

The Health Forum is still carried on. There are forty-nine newspapers in the State receiving the Forum now.

State clinic releases go out every other month to press chairmen of the various cancer clinics.

A general newspaper release goes out the alternate month to all newspapers in the State.

There have been three regular broadcasts each week throughout the year and one more was added in the fall. One of these broadcasts is published weekly in the New England Journal of Medicine and abstracts of another are published by several of the daily newspapers to which they are sent.

Adult Hygiene made arrangements for the "Business Woman" edition of the CommonHealth and for "Activities of the Massachusetts Department of Public Health."

A new popular pamphlet was published this year called "The Massachusetts Cancer Program."

#### MASSACHUSETTS COMMITTEE FOR THE WHITE HOUSE CONFERENCE ON CHILD HEALTH AND PROTECTION

The Division of Adult Hygiene contributed a part of its force to the Massachusetts Committee for the White House Conference on Child Health and Protection appointed by His Excellency, Governor Ely, in May, 1931, under the chairmanship of Dr. George H. Bigelow. Plans were outlined to present the findings of the Conference to the people, chiefly by speakers, first in two two-day institutes, one in Boston, the other in Springfield, in October.

The Committee formed four sections corresponding with those of the Washington Conference; namely, I, Medical Service; II, Public Health Service and Administration; III, Education and Training; IV, The Handicapped Child.

Each section was in charge of a chairman who became responsible for the selection of speakers on subjects falling within the scope of his section.

In the first six months of the Committee's activities, 160 speaking engagements were made before Women's Clubs, Parent-Teacher Associations, Men's Clubs, nursing organizations and miscellaneous groups.

A monthly bulletin of the activities of the Committee has kept its friends in touch with its doings.

#### STATE-AIDED CANCER CLINICS

The Franklin County Cancer Clinic ceased to exist early in 1931.

##### *Special Cancer Clinics:*

The policy of furnishing special instruction on cancer to practicing physicians has been continued. During the present year no state-wide graduate course in cancer was given, but several regional meetings in connection with individual clinics were held.

The first of these for 1931 was held in Fitchburg on January 15th. Dr. Robert Greenough, assisted by Dr. Ernest M. Daland and Dr. Joe V. Meigs, was in charge.

On May 27th a similar clinic was held in Pittsfield. Dr. Francis Carter Wood of New York was in charge.

In Brockton, Dr. Burton Lee, assisted by Dr. Channing Simmons, Dr. Joe V. Meigs and Dr. Richard Dresser, conducted a special cancer clinic on June 11th.

A special cancer clinic was held in Lawrence on October 20th with Dr. Grantley Taylor and Dr. Channing Simmons in charge.

The last one of these special clinics for this year was held in Worcester on November 4th with Dr. Burton Lee.

Public meetings on cancer were held in the cities where these special clinics were conducted. At these special meetings, in addition to the surgeons conducting the clinics, others have spoken. Among these were Dr. George H. Bigelow, Dr. Clarence C. Little, Dr. Shields Warren, Dr. Grantley Taylor, Dr. Herbert L. Lombard and Miss Elizabeth Ross.

##### *Cancer Clinics:*

During the past year 3,072 individuals came to the cancer clinics. This is a considerable increase over the 1930 attendance of 2,499. The female attendance was almost twice as great as the male. The percentage of individuals coming to the clinic with cancer was 23.1 contrasted with 25.5 for 1930. The attendance for the three years is shown in Table I. The percentage of males coming to the clinic



with cancer has been much greater than that of females. Both rates dropped in 1931. Precancerous conditions showed similar figures in both years.

Both the median age of the total attendance and the median age of cancer attendance are about the same as in preceding years. Of the total 355 cities and towns in the State, 222 were represented in attendance at the cancer clinics in 1931. This is an increase over preceding years.

As in the previous year, attendance was greatest at the Pondville clinic, and least in Newton. The Boston Dispensary and Pondville had the highest percentage of cancer cases in their attendance, while Newton, Brockton and Lowell had the lowest percentages. (Table III.)

The median duration before first visit to a physician is similar in 1931 to 1930. The duration before coming to the clinic has varied little throughout the four years as shown in Table V. The buccal and oesophagus group shows the shortest duration, and skin cancer the longest.

The percentage of individuals referred to the clinic by physicians has increased, but the percentage coming because of newspaper publicity and at the request of friends and relatives has decreased.

Three-fifths of all cancers were referred by physicians, while slightly over one-third of the total attendance came from physicians. Newspapers were responsible for one-eighth of the cancer cases and nearly one-third of the total attendance.

Table VII shows the reason for coming to the clinic by individual clinics. The largest percentage coming from physicians is at the Pondville clinic, and the smallest percentage at the Berkshire clinic. The greatest percentage coming because of newspapers was at the Brockton clinic, the very small percentages at Newton, Pondville and the Boston Dispensary clinics.

Eighty per cent of the uterine cancers were referred by physicians, and with the exception of skin cancers, over fifty per cent of cancers of all locations came from physicians. The newspapers brought in over one-sixth of the skin cancers.

The distribution of cancers by location has remained the same. Skin cancers lead, with buccal-oesophagus second and stomach last. There has been a decrease in the percentage of individuals coming to the clinics who have not seen physicians prior to their clinic visit. In 1929, 21.8 per cent had never consulted a physician, while in 1931 only 15.1 per cent had not.

About one-fifth of the breast and skin cancers and about one-seventh of the buccal cavities had never seen a physician prior to the first visit to the clinic. There has been a slight decrease in the cancer cases who came because of pain. This is encouraging, as pain is usually a symptom of late rather than of early cancer. Swelling brought most of the cases to the clinics during 1931, the rate being 35.2 per cent. Pain brought 33.4 per cent (Table XI).

The nativity distribution is shown in Table XII.

About three-fourths of the skin cases, one-half of the buccal-oesophagus group, one-fifth of the breast cases, one-eighth of the uterus, and all others, and less than 5 per cent of the stomach group were considered operable with a probable chance for cure.

A broad classification for diagnosis is given in Table XVI. Cancer and benign tumors have the highest rate with diseases of the cardiovascular system least.

TABLE I. — *Attendance at State-Aided Cancer Clinics*

	MALES			FEMALES			TOTALS		
	1929	1930	1931	1929	1930	1931	1929	1930	1931
Attendance . . . . .	758	904	1,111	1,348	1,595	1,961	2,106	2,499	3,072
Cancer . . . . .	274	314	352	260	322	343	534	636	695
Precancerous . . . . .	56	76	80	91	103	120	147	179	200
Other conditions . . . . .	365	436	578	824	988	1,265	1,189	1,424	1,843
Deferred diagnosis . . . . .	28	16	25	80	33	48	108	49	73
Undiagnosed* . . . . .	—	8	15	—	16	21	—	24	36
Normal . . . . .	35	54	61	93	133	164	128	187	225
Per cent with cancer . . . . .	36.1	34.7	31.7	19.3	20.2	17.5	25.4	25.5	23.1
Per cent with precancer . . . . .	7.4	8.4	7.2	6.8	6.5	6.1	7.0	7.2	6.6
Median age of clinic attendance . . . . .	56.3	55.6	55.1	47.6	47.3	46.5	50.4	50.2	48.8
Median age of cancer patients . . . . .	64.9	64.1	65.1	58.2	58.4	57.2	61.7	61.5	60.9

\*Undiagnosed was classified with Deferred Diagnosis prior to 1930.

TABLE II. — *Residents of Massachusetts Cities and Towns Attending State-Aided Cancer Clinics*

	1929	1930	1931
Number of places with 1 patient . . . . .	66	49	72
Number of places with 2-5 patients . . . . .	77	77	74
Number of places with 6-9 patients . . . . .	19	21	23
Number of places with 10 patients and over . . . . .	36	44	53
Total number of places . . . . .	198	191	222

TABLE III. — *Attendance at State-Aided Cancer Clinics, 1931*

CLINIC	Total Attendance	Per Cent Cancer	Per Cent Pre-cancerous	Per Cent Other Conditions	Per Cent Normal	Per Cent Deferred	Per Cent Undiagnosed
Berkshire . . . . .	80	17.5	10.0	63.8	6.3	2.5	0.0
Boston Dispensary . . . . .	201	33.7	5.0	47.2	9.5	4.5	0.0
Brockton . . . . .	293	14.0	4.1	71.6	8.5	1.0	0.7
Lawrence . . . . .	176	29.0	1.7	58.5	8.0	2.8	0.0
Lowell . . . . .	404	14.9	7.9	66.4	4.0	4.0	3.0
Lynn . . . . .	271	17.0	5.2	62.7	10.3	3.7	1.1
New Bedford . . . . .	163	21.5	0.0	72.4	0.6	4.3	1.2
Newton . . . . .	3	0.0	0.0	100.0	0.0	0.0	0.0
Pondville . . . . .	883	30.7	10.3	49.8	6.1	1.9	1.1
Springfield . . . . .	157	17.8	5.7	65.6	7.6	1.9	1.3
Worcester . . . . .	264	21.2	4.2	61.0	12.9	0.0	0.8
Worcester North . . . . .	177	14.7	5.6	68.9	9.6	0.6	0.6
Totals . . . . .	3,072	22.6	6.5	60.0	7.3	2.4	1.1

TABLE IV. — *Median Duration before First Visit to Physician, by Location of Cancer*

LOCATION OF CANCER	Median Duration in Months	
	1930	1931
Buccal and Oesophagus . . . . .	5.5	5.8
Stomach . . . . .	6.1	6.8
Uterus . . . . .	3.6	4.2
Skin . . . . .	14.5	12.7
Breast . . . . .	4.8	3.9
All Others . . . . .	6.6	3.9
Total . . . . .	6.7	6.4

TABLE V. — *Median Duration before First Visit to Clinic, by Location of Cancer*

LOCATION OF CANCER	1928	1929	1930	1931
Buccal and Oesophagus . . . . .	9.9 months	8.9 months	6.8 months	6.9 months
Stomach . . . . .	7.9 months	7.0 months	9.0 months	10.5 months
Uterus . . . . .	8.4 months	6.4 months	6.0 months	8.0 months
Skin . . . . .	Over 2 years	Over 2 years	Over 2 years	Over 2 years
Breast . . . . .	8.9 months	8.1 months	6.8 months	7.4 months
All Others . . . . .	10.5 months	8.3 months	12.3 months	9.0 months
Total . . . . .	11.8 months	12.6 months	12.2 months	12.2 months

TABLE VI. — *Reason for Coming to Clinic, by Diagnosis\**

[Rate per 100]

		Physician	Friends and Relatives	Newspapers	All Others
Cancer . . . . .	{ 1929	56.1	13.3	16.5	14.3
	{ 1930	56.9	10.8	17.8	16.2
	{ 1931	60.6	9.2	13.5	17.0
Precancerous . . . . .	{ 1929	37.2	14.5	40.0	9.0
	{ 1930	45.3	13.4	27.9	17.3
	{ 1931	42.0	14.0	27.0	17.5
Other Conditions . . . . .	{ 1929	26.2	18.8	42.9	13.2
	{ 1930	26.8	18.1	36.7	21.1
	{ 1931	29.7	15.9	35.7	19.6
Deferred . . . . .	{ 1929	24.1	21.3	37.1	18.5
	{ 1930	28.6	24.5	26.5	24.5
	{ 1931	43.8	12.3	26.0	17.8
Undiagnosed . . . . .	{ 1929	25.0	25.0	37.5	12.5
	{ 1930	41.2	14.7	26.5	17.6
	{ 1931	24.2	21.9	38.3	15.6
Normal . . . . .	{ 1929	28.9	15.5	43.8	13.9
	{ 1930	32.4	12.4	32.9	22.7
	{ 1931				
Total . . . . .	{ 1929	34.3	17.4	35.4	13.6
	{ 1930	36.0	15.9	31.6	19.1
	{ 1931	38.2	13.9	29.6	19.1

\*Does not total to 100 per cent, as some individuals gave more than one reason.

TABLE VII. — *Reason for Coming to Clinic, by Individual Clinic, 1931\**

[Rate per 100]

CLINIC	Physician	Friends and Relatives	Newspapers	All Others
Berkshire . . . . .	18.8	16.2	51.2	23.8
Boston Dispensary . . . . .	22.9	17.9	1.0	58.2
Brockton . . . . .	19.4	11.3	60.7	8.9
Lawrence . . . . .	36.4	13.1	37.5	13.1
Lowell . . . . .	22.3	22.0	47.8	8.2
Lynn . . . . .	27.3	8.9	41.3	23.6
New Bedford . . . . .	39.3	14.7	26.4	20.2
Newton . . . . .	33.3	33.3	0.0	33.3
Pondville . . . . .	67.2	15.7	1.1	16.0
Springfield . . . . .	19.7	14.7	51.6	14.0
Worcester . . . . .	29.5	4.5	38.2	30.3
Worcester North . . . . .	33.9	5.6	46.3	14.7
Total . . . . .	38.2	13.9	29.6	19.0

\*Does not total to 100 per cent, as some individuals gave more than one reason.



TABLE VIII. — *Reason for Coming to Clinic, by Location of Cancer\**  
 [Rate per 100]

LOCATION OF CANCER	Physician	Dentist	Social Worker	Nurse	Friends and Relatives	Clergy, Radio, Pamphlets	Newspapers	Lectures	Past Experience	Others
Buccal and Oesophagus	59.7 57.3 63.3 1929 1930 1931	— 1.3 0.6	2.6 3.9 1.9	1.8 2.6 5.1	14.9 9.9 8.9	0.9 0.7 0.6	10.5 19.1 14.6	0.0 0.0 0.0	7.0 5.3 5.1	2.6 2.6 1.3
Stomach	36.4 47.4 61.9 1929 1930 1931	— 0.0 0.0	0.0 7.9 4.8	0.0 0.0 0.0	18.2 15.8 14.3	0.0 0.0 0.0	9.1 5.3 0.0	0.0 0.0 0.0	27.2 21.1 19.1	9.1 2.6 0.0
Uterus	75.9 78.9 80.6 1929 1930 1931	— 0.0 0.0	5.2 5.3 6.9	1.7 0.0 2.8	5.2 1.8 0.0	0.0 0.0 0.0	10.3 10.5 5.6	0.0 0.0 0.0	1.7 5.3 4.2	0.0 0.0 0.5
Skin	45.9 47.4 49.8 1929 1930 1931	— 0.0 0.0	1.4 2.4 5.4	2.9 4.7 4.4	18.2 12.4 10.3	0.0 0.6 0.0	23.0 26.0 17.7	0.0 0.0 0.5	8.1 6.5 7.9	1.8 3.9 3.9
Breast	55.6 55.2 71.5 1929 1930 1931	— 0.0 0.0	2.3 2.6 2.9	5.7 2.6 1.4	15.9 16.4 7.1	0.0 0.9 0.0	15.9 14.6 7.1	1.1 0.9 0.0	6.8 5.2 10.0	0.0 1.7 1.4
All Others	63.1 68.8 1929 1930 1931	— 0.0 0.0	2.3 2.4 2.4	3.1 4.0 4.0	9.2 5.6 5.6	0.8 0.8 0.8	13.9 11.2 16.5	0.0 0.0 0.2	5.4 4.0 7.7	2.3 3.2 1.1
Total	56.0 56.9 60.7 1929 1930 1931	— 0.3 0.1	2.8 3.3 3.7	2.1 3.3 3.9	13.3 10.8 9.2	0.4 0.5 0.4	16.5 17.8 13.5	0.2 0.2 0.3	7.7 6.9 6.0	1.1 1.7 2.4

\*Does not total to 100 per cent, as some individuals gave more than one reason.

TABLE IX. — *Location of Cancer*  
[Rate per 100]

LOCATION OF CANCER	MALES				FEMALES				TOTALS			
	1928	1929	1930	1931	1928	1929	1930	1931	1928	1929	1930	1931
Buccal and Oesophagus	39.9	36.1	38.6	37.6	5.5	5.8	9.7	7.6	21.9	21.3	23.9	22.7
Stomach . .	3.4	3.3	7.7	3.7	0.8	0.8	4.4	2.3	2.0	2.1	6.0	3.0
Uterus . .	0.0	0.0	0.0	0.0	17.1	22.3	17.8	20.9	8.9	10.9	9.0	10.4
Skin . .	43.7	47.4	31.0	36.8	29.2	30.4	22.4	21.5	36.1	39.1	26.6	29.2
Breast . .	0.9	0.7	0.0	0.3	29.2	26.5	27.4	33.4	15.7	13.3	13.8	16.7
All Others .	12.0	12.5	22.7	21.7	18.2	14.3	18.4	14.2	15.3	13.3	20.5	18.0

TABLE X. — *Contact of Cancer Patients with Physician, by Location of Cancer*  
[Rate per 100]

LOCATION OF CANCER		No Physician	One Physician	Two or More Physicians
Buccal and Oesophagus . . . . .	1929	19.6	50.0	30.4
	1930	17.8	49.3	32.9
	1931	14.6	49.4	36.1
	1929	0.0	27.3	72.7
Stomach . . . . .	1930	15.8	44.8	39.4
	1931	9.5	52.4	38.1
	1929	10.5	56.2	33.3
	1930	7.0	59.6	33.4
Uterus . . . . .	1931	6.9	52.8	40.3
	1929	30.7	43.9	25.4
	1930	31.4	44.4	24.2
	1931	21.2	54.7	24.2
Skin . . . . .	1929	23.2	40.6	36.2
	1930	27.3	52.3	20.4
	1931	21.6	44.0	34.5
	1929	10.0	50.0	40.0
Breast . . . . .	1930	13.8	50.0	36.2
	1931	4.8	44.8	50.4
All Others . . . . .	1929	21.8	46.5	31.7
	1930	20.8	49.0	30.2
	1931	15.1	49.6	35.4
	1929			
Total . . . . .	1930			
	1931			

TABLE XI. — *Symptoms that Brought Patient to Clinic, by Diagnosis\**  
[Rate per 100]

SYMPTOM	CANCER			PREGNANT			OTHER CONDITIONS			DEFERRED			UNDIAGNOSED			NORMAL			TOTAL		
	1929	1930	1931	1929	1930	1931	1929	1930	1931	1929	1930	1931	1929	1930	1931	1929	1930	1931	1929	1930	1931
	44.7	33.6	35.8	42.8	18.4	25.0	43.2	38.7	38.2	35.2	32.6	31.5	—	37.5	23.5	35.2	30.5	26.7	42.7	35.2	35.2
	27.1	33.0	35.8	16.3	27.4	22.0	16.4	10.5	8.8	4.6	2.0	2.7	—	8.3	8.8	6.3	3.7	5.3	12.3	16.8	15.4
Ulceration and Bleeding	27.4	15.9	13.7	20.4	14.0	9.5	17.9	16.4	13.7	33.3	18.4	28.8	—	12.5	26.5	11.7	8.0	8.0	20.9	15.5	13.5
Pain	24.1	26.2	23.4	12.2	31.3	34.0	1.9	8.6	12.3	1.9	2.0	1.4	—	41.6	58.8	38.3	42.3	43.1	38.5	36.2	33.4
Deformity	2.2	7.1	7.6	3.4	1.4	0.6	8.2	8.1	8.5	13.9	14.3	23.3	—	8.3	5.9	2.3	1.1	6.7	2.1	9.1	11.9
Loss of weight	8.1	6.9	9.4	1.4	0.6	0.5	7.3	6.7	4.3	9.3	8.2	9.6	—	4.2	14.7	7.8	3.7	10.7	7.9	7.1	8.7
Nausea	7.3	3.9	1.7	3.4	1.7	0.0	6.1	3.6	3.1	1.9	6.1	2.7	—	0.0	0.0	5.5	1.6	0.4	7.1	5.5	3.7
Itching	10.3	5.5	1.9	10.2	4.5	2.0	3.2	1.0	1.1	4.6	2.0	0.0	—	0.0	0.0	5.5	1.6	0.4	7.2	4.0	2.5
Scaly Skin	6.6	3.1	0.9	22.4	8.9	5.5	3.2	3.7	6.1	0.0	6.1	13.7	—	12.5	5.9	2.3	7.5	9.8	5.4	3.9	5.9
Others	0.4	3.3	4.3	0.7	0.6	1.5	0.4	—	0.8	—	4.1	0.0	—	0.0	0.0	—	12.3	17.0	—	1.9	3.0
Observation**	—	1.4	2.9	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Unknown	2.1	0.2	0.3	2.0	0.0	0.5	1.9	0.3	0.1	0.0	0.0	0.0	—	0.0	0.0	7.8	0.0	0.9	2.2	0.2	0.2

\* Does not total to 100 per cent as multiple symptoms were given by some patients.

\*\* Individuals who were treated at hospital and came to the clinic for observation.



TABLE XII. — *Nationality of Individual by Individual Clinic*

[Rate per 100]

Clinic	United States	Ireland	Russia-Poland	Italy	Britain	Teutonic	Scandinavia	Latin	Canada	Baltic	Others	Unknown
Berkshire . . . . .	1929 75.2 1930 78.2 1931 78.7	5.6 5.8 3.8	4.5 4.3 0.0	1.1 2.9 3.8	3.4 1.5 6.3	1.1 0.0 2.5	1.1 1.5 2.5	0.0 1.5 1.3	4.6 1.5 5.0	0.0 0.0 1.3	1.1 1.5 0.0	2.3 1.5 0.0
Boston Dispensary . . . . .	1929 48.1 1930 42.4 1931 41.8	12.5 17.8 14.9	10.6 8.7 10.0	5.3 3.4 2.0	4.3 7.5 7.5	1.4 1.9 1.0	0.5 1.9 1.5	1.0 1.9 1.0	12.0 10.1 10.9	1.4 2.4 1.0	1.0 4.8 4.3	1.9 0.0 0.0
Brockton . . . . .	1929 — 1930 69.0 1931 70.6	— 3.5 3.8	— 2.1 6.5	— 2.1 3.3	— 2.8 8.9	— 0.7 1.7	— 7.1 3.1	— 0.7 1.4	— 11.3 10.6	— 0.7 0.8	— 0.0 0.0	— 0.0 0.0
Lawrence . . . . .	1929 44.8 1930 56.0 1931 60.2	8.9 5.7 5.0	8.9 4.5 1.1	6.7 4.0 0.3	11.2 10.8 4.5	8.9 6.7 2.8	0.8 0.0 0.6	0.0 0.0 3.9	17.1 11.2 28.5	0.7 0.0 0.6	0.0 0.0 1.1	0.0 0.0 0.0
Lowell . . . . .	1929 49.5 1930 52.0 1931 54.5	9.0 7.8 7.9	2.0 2.7 1.5	0.0 0.0 1.6	3.7 5.9 5.5	0.8 0.2 1.2	0.6 0.7 0.8	3.9 3.7 0.4	25.5 23.5 19.1	1.0 0.4 0.0	2.3 1.7 0.0	0.0 0.0 0.5
Lynn . . . . .	1929 60.5 1930 71.7 1931 62.3	6.2 3.4 5.9	3.5 2.9 4.1	2.0 1.5 0.0	2.9 4.1 19.4	0.5 0.4 1.9	0.5 0.4 1.3	1.0 1.8 9.0	14.6 16.6 12.9	0.0 0.0 0.0	1.3 0.0 1.9	0.4 0.0 0.0
New Bedford . . . . .	1929 45.8 1930 46.2 1931 52.1	3.9 2.8 4.9	3.9 2.8 3.1	0.0 0.0 0.0	20.1 16.6 0.0	0.5 1.2 0.0	0.0 0.0 0.0	10.3 13.1 11.6	13.1 11.6 50.0	0.0 0.0 0.0	3.3 8.6 0.0	0.0 0.0 0.0
Newton . . . . .	1929 50.0 1930 60.0 1931 33.3	0.0 10.0 66.7	0.0 0.0 0.0	0.0 0.0 0.0	10.0 0.0 0.0	0.0 0.0 0.0	0.0 0.0 0.0	0.0 0.0 0.5	20.0 50.0 11.9	0.0 0.0 0.2	0.0 0.0 1.1	0.0 0.0 0.3
Pondville . . . . .	1929 66.2 1930 65.0 1931 68.2	6.0 5.4 6.2	0.9 1.3 1.7	2.2 2.0 2.8	5.8 3.2 5.0	1.8 0.8 0.6	2.0 1.2 0.5	2.5 0.8 1.2	12.3 12.0 7.5	1.5 1.4 0.0	1.3 1.7 1.2	0.3 0.1 0.0
Springfield . . . . .	1929 73.3 1930 66.7 1931 59.2	4.4 5.7 12.7	4.3 6.4 2.1	1.9 1.4 4.1	5.0 3.8 5.7	0.6 2.6 0.9	0.5 0.0 4.1	1.2 1.4 0.7	9.9 11.5 10.2	0.0 0.6 3.3	1.4 1.9 0.7	0.0 0.0 0.5
Worcester . . . . .	1929 64.3 1930 60.8 1931 63.6	6.2 9.4 7.6	2.1 3.3 5.3	4.1 2.8 3.4	4.1 5.7 4.6	0.7 0.9 1.1	2.7 2.8 1.8	0.4 0.5 0.0	9.5 9.0 15.6	4.9 2.3 23.9	1.1 0.9 0.9	0.0 0.0 0.0
Worcester North . . . . .	1929 48.7 1930 55.8 1931 49.7	6.0 5.0 3.4	0.9 0.0 2.3	0.9 1.7 2.8	4.6 3.3 1.1	1.8 0.8 0.6	1.8 0.6 0.6	0.0 0.0 0.6	18.3 15.0 20.9	0.0 0.0 17.5	0.0 0.0 0.6	0.0 0.0 0.5
Total . . . . .	1929 58.6 1930 59.5 1931 61.3	6.6 6.5 6.9	3.5 3.1 3.0	1.9 2.0 2.1	6.1 6.3 4.9	1.7 1.3 1.1	1.5 1.3 1.3	1.7 2.5 1.3	15.2 14.1 14.0	1.8 1.8 2.1	0.9 1.6 2.1	0.5 0.2 0.1

TABLE XIII. — *Type of Cancer, by Location of Cancer*

[Rate per 100]

LOCATION OF CANCER	Operable Cancer Probable Cure		Operable Cancer Possible Cure		Operable Cancer Palliative Measures Only		Inoperable Cancer	
	1930	1931	1930	1931	1930	1931	1930	1931
Buccal and Oesophagus . . . . .	51.4	50.4	23.3	23.6	11.3	12.7	14.0	13.4
Stomach . . . . .	2.6	4.8	10.5	14.3	18.4	38.1	68.5	42.8
Uterus . . . . .	19.6	13.9	35.7	25.0	21.4	37.5	23.2	23.6
Skin . . . . .	81.6	77.6	12.4	15.9	3.6	3.9	2.4	2.5
Breast . . . . .	20.5	21.9	43.2	36.0	17.0	24.6	19.3	17.5
All Others . . . . .	24.8	14.5	27.9	32.3	23.2	31.4	24.1	21.8
Total . . . . .	44.0	42.0	24.4	24.8	13.8	18.9	17.8	14.2

TABLE XIV. — *Type of Treatment Recommended, by Location of Cancer, 1931*

[Rate per 100]

LOCATION OF CANCER	Operation	Radiation	Operation and Radiation	Observation	Study	Advice	Medical Treatment
Buccal and Oesophagus . . . . .	27.2	53.2	10.8	1.3	3.2	0.0	4.4
Stomach . . . . .	38.1	9.5	4.8	14.3	9.5	4.8	19.0
Uterus . . . . .	15.3	65.3	4.2	11.1	4.2	0.0	0.0
Skin . . . . .	25.6	67.0	5.9	0.5	0.5	0.0	0.5
Breast . . . . .	58.6	23.3	12.1	0.9	3.5	0.0	1.7
All Others . . . . .	37.6	36.0	8.8	5.6	8.8	0.0	3.2
Total . . . . .	32.9	49.2	8.4	3.2	3.7	0.1	2.6

TABLE XV. — *Recommendation for Place of Treatment for Cancer Patients, by Location of Cancer*

[Rate per 100]

LOCATION OF CANCER		Pondville	Local Hospital	Other Institutions	Local Physician	Clinic	Unknown
Buccal and Oesophagus	1929	39.5	19.3	9.6	15.8	15.8	0.0
	1930	33.6	28.9	10.5	8.6	16.4	2.0
	1931	46.8	21.5	3.8	12.0	12.7	3.2
	1929	27.3	27.3	9.1	27.3	9.1	0.0
Stomach . . . . .	1930	31.6	23.7	0.0	18.4	7.9	18.4
	1931	33.4	42.8	0.0	4.8	14.3	4.8
	1929	36.2	44.8	1.7	5.2	8.6	3.5
Uterus . . . . .	1930	59.7	22.8	5.3	5.3	3.5	3.5
	1931	56.9	27.8	8.3	4.2	2.8	0.0
	1929	21.5	18.2	16.3	13.9	29.6	0.5
Skin . . . . .	1930	24.8	29.0	8.3	12.4	25.4	0.0
	1931	27.1	19.7	11.8	13.3	27.6	0.5
	1929	28.2	36.6	8.5	21.1	5.6	0.0
Breast . . . . .	1930	39.8	46.6	4.5	5.7	3.4	0.0
	1931	35.4	46.6	6.9	8.6	2.6	0.0
	1929	33.8	28.2	9.9	14.1	9.9	4.2
All Others . . . . .	1930	34.6	37.0	4.6	11.5	10.0	2.3
	1931	54.4	23.2	5.6	6.4	8.0	2.4
Total . . . . .	1929	29.6	25.3	11.2	14.6	18.2	1.1
	1930	34.6	32.1	6.8	10.1	14.2	2.4
	1931	41.2	26.7	7.3	9.8	13.7	1.4

TABLE XVI. — *Diagnosis*

[Rate per 100]

DIAGNOSIS	1930	1931
Cancer primary . . . . .	18.7	16.2
Cancer with metastases . . . . .	4.1	3.7
Cancer recurrent following operation . . . . .	2.7	2.7
Hodgkin's Disease . . . . .	0.3	0.4
Benign tumor . . . . .	14.1	16.9
Precancerous lesions . . . . .	7.2	6.5
Diseases of the digestive system . . . . .	7.5	8.9
Diseases of the cardiovascular system . . . . .	2.2	2.0
Diseases of the genito-urinary system . . . . .	5.8	6.0
Mouth lesions . . . . .	3.0	2.2
Diseases of the skin . . . . .	7.3	6.4
All others . . . . .	5.2	4.4
Noncancerous, diagnosis not established . . . . .	11.6	13.0
Normal . . . . .	7.5	7.3
Deferred . . . . .	2.0	2.4
Undiagnosed . . . . .	1.0	1.1

## REPORT OF DIVISION OF BIOLOGIC LABORATORIES

BENJAMIN WHITE, PH.D., *Director*ELLIOTT S. ROBINSON, M.D., PH.D., *Assistant Director*

The year has been a most successful one for both laboratories, not only in the number of tests done and products distributed, but also in the results obtained in the scientific studies made.

## I. ANTITOXIN AND VACCINE LABORATORY

The activities of this laboratory may be discussed under the following headings:

1. *Distribution of Products*

	1927	1928	1929	1930	1931
Diphtheria Antitoxin, 1,000 unit doses . . . . .	342,225	319,516	315,441	264,378	212,601
Antimeningococcic Serum, 15 cc. doses . . . . .	3,116	3,482	4,413	5,433	3,577
Antimeningococcic Serum, 15 cc. doses (Conc.) . . . . .	—	—	18	158	115
Antimeningococcic Serum, bulk cc. . . . .	—	—	—	7,200	—
Antipneumococcic Serum, 100 cc. doses . . . . .	169	179	80	1	—
Antipneumococcic Serum, Conc. 15 cc. doses . . . . .	—	127	691	1,253	1,392
Smallpox Vaccine Virus, capillary tubes . . . . .	298,328	331,925	422,115	325,427	290,824
Typhoid-Paratyphoid Vaccine, 1 cc. doses . . . . .	105,472	104,117	85,681	93,788	94,635
Schick Outfits, 50 doses each . . . . .	5,503	5,752	6,428	8,481	8,503
Diphtheria Toxin (Bulk) cc. . . . .	655	475	785	1,000	175
Diphtheria Toxin-Antitoxin Mixture, 1 cc. doses . . . . .	311,943	361,130	357,944	419,347	474,881
Diphtheria Toxoid (Bulk) cc. . . . .	—	—	—	—	3,600
Scarlet Fever Streptococcus Antitoxin, doses . . . . .	6,075	5,483	4,964	4,841	3,433
Normal Serum, cc. . . . .	23,135	148,100	647,365	175,970	51,375
Silver Nitrate Solution (ampoules) . . . . .	21,730	69,825	59,692	52,215	64,423
Anti-Measles-Diplococcus Serum, bottles . . . . .	106	187	24	3	447
Influenza Serum, bottles . . . . .	26	10	32	245	481
Tuberculin (ampoules) . . . . .	—	—	—	39	734
Tuberculin (Bulk) cc. . . . .	—	—	—	—	100
Sodium Citrate, vials . . . . .	—	—	—	—	1,563
Diagnostic Serum, cc. Pneumococcus I . . . . .	—	—	—	135	415
" " " " II . . . . .	—	—	—	85	290
" " " " III . . . . .	—	—	—	80	255
" " " Typhoid . . . . .	—	—	—	8	10
" " " Paratyphoid A . . . . .	—	—	—	5	15
" " " Paratyphoid B . . . . .	—	—	—	2½	20
Arspenamine 0.4 gram (ampoules) . . . . .	—	—	—	273	384
" 0.6 " " . . . . .	—	—	—	490	903
" 3.0 " " . . . . .	—	—	—	1,500	2,815
" 0.3 " " . . . . .	—	—	—	500	150
" 2.0 " " . . . . .	—	—	—	100	25
Sulpharsphenamine, 0.3 gram (ampoules) . . . . .	—	—	—	1,502	3,552
" 0.4 " " . . . . .	—	—	—	1,504	1,688
" 0.6 " " . . . . .	—	—	—	4,269	11,575
" 1.0 " " . . . . .	—	—	—	743	1,591
" 3.0 " " . . . . .	—	—	—	455	1,253
Neoarsphenamine, 0.45 gram (ampoules) . . . . .	—	—	—	4,419	10,228
" 0.6 " " . . . . .	—	—	—	11,887	23,929
" 0.9 " " . . . . .	—	—	—	3,303	8,649

(Distribution figures in previous years represented distribution during fiscal years. The above figures represent distribution for the calendar years.)

(a) *Diphtheria Antitoxin*. — Coincident with the remarkably low diphtheria rate in Massachusetts, the distribution of this product has fallen off. A reserve stock, however, has been produced and is carried in anticipation of a possible increase in diphtheria.

(b) *Antimeningococcic Serum*. — As in the case of diphtheria, the decreased prevalence of meningococcus meningitis lessened the demand for this product.

(c) *Antipneumococcic Serum*. — This product will be discussed under No. 9.

(d) *Smallpox Vaccine Virus*. — The distribution of this product decreased, since there were no unusual demands occasioned by outbreaks of smallpox in the State. The amount accumulated, however, has been somewhat in excess of other years and the reserve stock is now at a higher level than ever before.

(e) *Typhoid-Paratyphoid Vaccine*. — There was a slight increase in the number of doses of this product.

(f) *Schick Outfits*. — The number of Schick outfits distributed continued to increase, and the gratifying feature of this item was the larger proportion of outfits distributed to private physicians.

(g) *Diphtheria Toxin-Antitoxin Mixture*. — The distribution of this product sets a record for this laboratory. For the past three years the number of doses sent out has been gradually increasing, and the greater number of immunizations done in

this State must eventually affect the diphtheria rates. Reports concerning both the immunizing value of this product and the freedom from unfavorable reactions attending its use continue to come to us. The general satisfaction that toxin-antitoxin has given would seem to show that this type of diphtheria immunizing agent should be continued although diphtheria toxoid may be substituted for children of preschool age.

(h) *Scarlet Fever Streptococcus Antitoxin*. — In spite of an increase in the number of cases of scarlet fever, the distribution of this product decreased. This has been due to the fact that recent lots were not of satisfactory potency, and distribution was temporarily discontinued.

(i) *Tuberculin, "O.T."* — This product has been licensed by the United States Treasury Department and is being regularly supplied not only to the Division of Tuberculosis, but to physicians throughout the Commonwealth.

(j) *Sodium Citrate*. — The distribution of this product began in March, and an unexpected demand for it arose.

(k) *Silver Nitrate Ampoules*. — There was nearly a twenty per cent increase in the distribution of this item.

(l) *Anti-Influenza Serum*. — This product is prepared on an experimental basis in collaboration with Dr. Hugh K. Ward of the Department of Bacteriology of the Harvard Medical School, and is being given clinical trial under Doctor Ward's direction in several children's hospitals. The product, however, is not for general distribution and is not for sale.

(m) *Diphtheria Toxoid*. — The small amount of diphtheria toxoid distributed was for clinical test only in connection with studies on the preparation of this product.

(n) *Diagnostic Serums*. — In addition to the previous pneumococcus diagnostic serums for Types I, II and III prepared here under the special appropriation for the pneumonia study, diagnostic serums for the other twenty-nine types have been purchased and distributed to laboratories cooperating in the special pneumonia study.

(o) *Arsenical Products*. — The free distribution of these products of outside manufacture was continued, and the names of many physicians who had not previously ordered these products were added to our list.

In addition to the products listed above, defibrinated blood, red blood cell sediments and other waste products were supplied free of charge to various investigators.

## 2. Expenses

YEAR	PERSONAL SERVICES		EXPENSES		TOTAL	
	Appropriation	Spent	Appropriation	Spent	Appropriation	Spent
1927 . . . .	\$50,355 00	\$50,261 54	\$34,611 11	\$34,579 87	\$84,966 11	\$84,841 41
1927* . . . .	-	-	29,500 00	29,488 68	29,500 00	29,488 68
1928 . . . .	59,000 00	58,919 09	38,005 37	37,955 34	97,005 37	96,874 22
1929 . . . .	63,400 00	63,392 26	39,560 48	39,261 97	102,960 48	102,654 23
1930 . . . .	67,700 00	67,698 66	42,412 45	42,243 09	110,112 45	109,941 75
1931 . . . .	71,000 00	70,984 35	42,556 90	42,504 57	113,556 90	113,488 92

\*Special appropriation for purchase and installation of equipment.

(a) The slight increase in expenditures was mainly on the salary account. As mentioned in last year's report, the salaries paid to workers in the non-professional grades are now satisfactory and, particularly in view of the present economic conditions, they may be said to represent entirely adequate compensation for the work done. The salaries for the professional grades, in spite of present conditions, when the experience and responsibility and type of the worker required are considered, and also when compared to salaries paid in similar institutions, are much too low. While the present time is decidedly not one for any agitation for salary raises, substantial increases must be made for the professional grades as soon as conditions become more favorable.

(b) *Sale of Products*. — In the sale of products outside the State of Massachusetts, the Department followed its usual policy of declining all invitations to bid on



yearly contracts with hospitals, health departments or other institutions and organizations. In order, however, that this laboratory might continue to come under the regulations of the United States Treasury Department, some sales of surplus products have been made, principally in neighboring states.

### 3. Improvements

(a) *Schick Outfits*. — As a result of the studies carried on in this laboratory for the past three years on the stabilization of diphtheria toxin, a new and improved form of Schick outfit came to production in which the toxin is ready-diluted to the required Schick strength in a solution containing 0.25 per cent Witte peptone. This new outfit has been well received by the physicians throughout the Commonwealth.

(b) *Vaccine Virus*. — A new technique for collecting vaccine virus resulted in a remarkable diminution of the bacterial count of the crude virus. Many lots were sufficiently free from all types of bacteria so that they could be processed immediately after collection. A new and more accurate method for determining the potency of all lots of vaccine virus was put into effect, giving us one more rigid control on the efficacy of this product.

(c) *Diphtheria Antitoxin*. — Owing to the production of a diphtheria toxin of higher potency and of changes in the method of immunizing the horses, the antitoxic potency of the routine bleedings of these horses has shown a gratifying increase. With more potent lots of plasma, it is now possible to prepare a concentrated product of higher unitage. Furthermore, continued study of the concentration process has led to further refinements in the concentration of this antitoxin and to a product of even higher quality than heretofore.

(d) *Plant and Equipment*. — With the generous aid of the authorities of Harvard University, the buildings and the grounds have been improved. Professor Oakes Ames of the Arnold Arboretum and his assistant, Mr. Smith, have laid out a plan for decorative planting and have already done much to improve the appearance of the property. The quarantine stable has been practically rebuilt; a bituminous pavement has been laid between the quarantine stable and the new stable, while many other improvements have been made in the stable and laboratory buildings.

Much new apparatus has been added which was required, not only by our special investigations, but also for lessening the labor incident to many of the routine activities. Never before has the laboratory been so well equipped as at present.

### 4. Personnel

The record of the past year is gratifying in the few changes which have been made in the staff of the laboratory. The professional group remains the same with one exception and the only other change which occurred was due to retirement. This happy state, however, can not be expected to continue with the return of more prosperous times, because it will be impossible to retain some of our professional workers at the present low salaries.

A reorganization of various functions of the laboratory was made with an improvement in the routine work of the laboratory.

On January 14, Floyd D. Hager, Ph.D., was appointed Senior Chemist to take the place of William E. Bunney, Ph.D., who resigned in January to accept the appointment as Associate Director, Bureau of Laboratories of the Michigan Department of Health.

### 5. Educational

The demonstrations to nurses, college and medical school students were continued. On account of the great demand for such demonstrations, it has been necessary to limit them to Wednesday afternoons. These demonstrations have had an attendance of 822. The usual course in Applied Immunology in connection with the Harvard School of Public Health was given in May, with a larger attendance than usual. Students from various countries were in attendance and several of them remained at the laboratory for varying periods to familiarize themselves with the methods used in the preparation of biologic products. Two students in the course on Public Health Laboratory Methods, in which this laboratory co-operates with Simmons College, were given the usual eight weeks' instruction in this laboratory.

6. *Lectures and Addresses*

The Director and Assistant Director gave lectures and demonstrations in the course on Immunology at the Harvard Medical School, in the course given jointly by the Departments of Preventive Medicine and Pediatrics in the Harvard Medical School, and also in the courses for graduates of the same school. The laboratory has had many visitors from various parts of this country and from Canada, China, Czechoslovakia, Greece, Haiti, India, Italy, Jamaica, B.W.I., Japan, Manchuria, Porto Rico, Roumania, Salvador, Siam and Sweden.

7. *Investigations*

(a) Doctor Bunney and then Doctors White and Malcolm carried on the study of a buffer diluent for diphtheria toxin. As a result of these studies, it was found that the Schick reactions produced by the toxin made up in the improved diluent were entirely comparable to those produced by freshly diluted toxin. This laboratory, therefore, has substituted the Witte peptone diluent and since June, 1931, has been distributing Schick outfits in which the toxin is already diluted to Schick strength. These new outfits not only found favor in this State, but the method has been adopted by some of the commercial laboratories.

(b) Doctor Robinson and his assistants have been studying methods for the production of diphtheria toxin, using a method based on the original Hartley method, in which the toxin broth is never submitted to any temperature higher than 80° C. The broth is sterilized by filtration instead of by autoclaving. This study has resulted in a satisfactory increase in the toxicity of diphtheria toxin and in the elimination of failures. The various batches show from 15 to 38 flocculating doses, from 500 to more than 2,000 minimum lethal doses, and from 10 to more than 20 L+ doses per cubic centimeter. The ability to produce regularly lots of such high toxicity and the elimination of failures greatly reduce the cost of this biologic agent and also will make it possible to produce a toxoid of high antigenic power.

(c) Doctor Robinson and his colleagues have been studying the production of diphtheria toxoid, especially from toxin of high potency, and their investigations have progressed to a point where it should soon be possible to distribute toxoid.

The studies on the purification of diphtheria toxoid by acid precipitation begun by Doctor Bunney were continued by Doctor Robinson, but as yet this agent has not come to production.

(d) Doctor Robinson with Doctor McComb has been testing the relative values of the alum and calcium chloride methods of immunizing horses against diphtheria toxin. By the addition of either one of these chemicals to toxin, it has been found in other laboratories that diphtheria antitoxin of highly increased titer could be produced. The experience here corroborates this fact. By using these methods the average antitoxin titer of the various horses practically doubled. This means that there will be available for concentration antitoxic plasma of higher unitage and that the required amount of diphtheria antitoxin can be produced with fewer horses.

(e) *Silver Nitrate Ampoules.* — Mr. Cianciarulo studied the various factors affecting the keeping qualities of the one per cent silver nitrate solution contained in wax ampoules. He found that the ampoules as now made cause little or no deterioration in the silver nitrate solution after storage for at least six months.

(f) *Media.* — Doctor Hager has been making a study of various substances for nutrient media and his results show that for routine purposes more luxuriant bacterial growth can be obtained with a considerable money saving.

(g) *Meningococcus Poison.* — Doctor Malcolm has been studying the toxic constituents of meningococcus. He has found that this organism washed free from extracellular substances can be made to yield a poison which causes in experimental animals some of the characteristic pathological effects following meningococcus infection in man. The injection of this substance in rabbits produces an immunity against itself, as is shown by the presence of neutralizing substances in the blood serum of these animals. This work has not yet progressed sufficiently for publication.

(h) *Protein Derivatives.* — Doctor Hager has been investigating the possibility



of denaturing various immune proteins by chemical means with an idea of making products for therapeutic use which would hold no danger of causing shock. This work is still in progress.

(i) *Nature of Antibodies.* — Doctor Hager is also carrying on studies concerning the chemical nature of antibodies, particularly of diphtheria antitoxin.

(j) *Excretion of Antitoxin.* — This laboratory furnished accommodations and technical facilities to Dr. J. Y. Sugg of the Medical Department of Vanderbilt University, who desired to carry on a study of the excretion of diphtheria antitoxin through the urine. Doctor Sugg has shown that where man or animals have diphtheria antitoxin in the blood, some of this antitoxin is excreted both in the saliva and in the urine.

(k) *Inheritance of Blood Groups.* — Members of the staff have given advice and technical assistance to Professor W. E. Castle and Dr. Clyde E. Keeler of the Animal Genetics Department of the Bussey Institution in their study of the inheritance of blood groups in rabbits, a phenomenon discovered by Landsteiner and Levine. This study has already developed many facts of interest and is being continued.

(l) *Bee Venoms.* Advice and assistance were also given to Mr. Lacaille, a graduate student in the Bussey Institution, who carried out here preliminary experiments in a study of the action of bee venoms on experimental animals. Mr. Lacaille is continuing this study in the Division of Plant and Animal Pathology of the Rockefeller Institute at Princeton.

#### 8. *Poliomyelitis Convalescent Serum*

This laboratory assisted the Harvard Infantile Paralysis Commission by processing convalescent serum from blood obtained in Massachusetts and other New England states. This serum has been put through the same processes as apply to the preparation of other immune serums. The serum from individual donors received from the Commission was tested for sterility and all sterile lots pooled. Three-tenths per cent Trikresol was then added to the pooled serum, which was then filtered through a Berkefeld filter. Sterility tests were put on the filtrate and if found to be sterile, the filtered serum was bottled in 20 cubic centimeter vials. After bottling, the usual sterility tests were placed on each batch. Because this serum had been received solely from the Harvard Infantile Paralysis Commission, its distribution was restricted to that Commission, this laboratory merely co-operating to the extent described. Altogether, 86,675 cubic centimeters of this serum was received at the laboratory and 3,618 twenty cubic centimeter vials, totalling 72,360 cubic centimeters of serum, were bottled for distribution. The extra expenses incident to this work were met by a share of the appropriation to the Department from the Emergency Fund of His Excellency, the Governor.

#### 9. *Special Pneumonia Study*

Under a grant received from the Commonwealth Fund of New York City, this laboratory has been conducting studies on pneumococcus immunity. The questions of media, of the dissociation of pneumococci and of the effect of soaps on these organisms are under investigation. In addition, an extensive experiment was conducted to determine the best antigens and the most favorable injection and bleeding intervals for the production of a more potent antipneumococcic serum. Various methods, principally those proposed by Felton, for the concentration of antipneumococcic serum were investigated and a comparative study made of the different procedures for determining the potency of this product. A laboratory room, a mouse breeding room and a rabbit room were equipped for this special work and a separate staff recruited consisting of Dr. LaVerne Barnes, a Junior Bacteriologist, a Laboratory Helper and two Laborers. The expenses for this special study are paid from the Pneumonia Service Fund contributed by the Commonwealth Fund of New York, and the serum produced is distributed only to hospitals and consulting physicians chosen to cooperate in this study. It is hoped that this work may be continued for four more years.

#### 10. *New Products*

(a) *Sodium Citrate.* — This product consists of a vial containing three cubic centimeters of sterile 4 per cent sodium citrate solution. The contents are intro-

duced into a syringe into which is drawn 25 to 30 cubic centimeters of adult whole blood, and this mixture is then injected intramuscularly into children who have been exposed to measles. Its particular value is in very young children and in children to whom an attack of measles would present an unusual hazard. When this procedure is used immediately after exposure, complete protection for a short time follows, but if the injection is delayed for five or six days after exposure, the child may have a mild and harmless attack of measles and at the same time acquire permanent active immunity. Although no detailed reports are available, the continued demand would indicate the usefulness of this product.

(b) *Tuberculin, "O.T."* Now that Federal license has been obtained for this product, it is added to the list of products for sale.

11. Publications

- 1. Bunney, William Edward: The action of formaldehyde on diphtheria toxin. Jour. Immunol., Vol. XX, No. 1, p. 47, Jan. 1931.
- 2. Bunney, William E. and White, Benjamin: Advantages and disadvantages of the buffered diluent for diphtheria toxin. Jour. Immunol., Vol. XX, No. 1, p. 61, Jan. 1931.
- 3. Bunney, William Edward: A new diluent for diphtheria toxin in the Schick test. Jour. Immunol., Vol. XX, No. 1, p. 71, Jan. 1931.
- 4. Bunney, William E., Cianciarulo, J. and Kiamil, Mumtaz: A study of the acid precipitation of diphtheria toxin. Jour. Immunol., Vol. XX, No. 6, p. 417, June, 1931.
- 5. Bunney, William E. and Kiamil, Mumtaz: The speed of flocculation of diphtheria toxin. Jour. Immunol., Vol. XX, No. 6, p. 433, June, 1931.

12. Inspection

Dr. George W. McCoy, Director of the National Institute of Health of the United States Public Health Service, made the annual inspection of this laboratory on April 4. The United States Treasury Department license to manufacture and sell the present list of biologic products was continued.

13. Acknowledgment

The Director desires to acknowledge the continued faithful and conscientious services of the employees of this laboratory and their share in bringing the laboratory to its present successful state of operation.

II. WASSERMANN LABORATORY

WILLIAM A. HINTON, M.D., *Chief of Laboratory*

1. Tests and Examinations

	1927	1928	1929	1930	1931
Wassermann Tests . . . . .	68,050	75,890	81,743	89,864	97,444
Kahn Tests . . . . .	2,691	2,694	3,594	3,822	12,735
Hinton Tests . . . . .	—	—	—	13,060	15,412
Modified Hinton Tests . . . . .	—	—	—	12,025	—
Gonococcus Fixation Tests . . . . .	1,505	1,793	2,498	2,790	2,560
Lange's Colloidal Gold Tests . . . . .	35	30	89	50	79
Complement Fixation Tests for Glanders . . . . .	18	36	23	30	32
Specimens of Milk Examined for Tuberculosis . . . . .	46	21	—	—	1
Diagnostic Examinations for the Division of Animal Industry:					
(a) Complement Fixation Tests for Glanders . . . . .	23	42	116	78	13
(b) Examinations for Rabies . . . . .	518	538	458	460	515
(c) Pathologic and Bacteriologic Examinations . . . . .	49	35	24	35	32
(d) Agglutination Tests for Bacillus abortus . . . . .	—	783	4,383	8,643	8,966
(e) Specimens of Milk Examined for Tuberculosis . . . . .	—	—	—	52	—
Diagnostic Examinations for Lakeville State Sanatorium . . . . .	—	5	—	—	—
	72,935	81,867	92,928	130,909	137,789

(Distribution figures in previous years represented distribution during the fiscal years. The above figures represent distribution for the calendar years.)

Table I shows that in the past five years there has been a 43 per cent increase in the number of Wassermann tests and an 88 per cent increase in the total number of all tests done. This greatly augmented amount of work has been accomplished with only a 22 per cent increase in expenditures, while the cost per test has declined from 24.5 cents to 15.8 cents — a 35.5 per cent decrease.



2. *Expenses*

YEAR	PERSONAL SERVICES		EXPENSES		TOTAL	
	Appropriation	Spent	Appropriation	Spent	Appropriation	Spent
1927 . . . .	\$12,616 00	\$12,506 91	\$5,300 00	\$5,068 66	\$17,916 00	\$17,575 57
1928 . . . .	14,000 00	13,723 34	5,182 25	5,094 01	19,182 25	18,817 35
1929 . . . .	15,800 00	15,328 92	5,300 00	5,297 13	21,100 00	20,626 06
1930 . . . .	16,500 00	15,935 42	5,704 75	5,688 54	22,204 75	21,623 96
1931 . . . .	16,600 00	16,591 76	5,213 34	5,213 34	21,813 34	21,805 10

An analysis of the money spent by this laboratory shows that the twenty-two per cent increase is entirely on the salary account, while the amount spent on the expense account is actually one hundred dollars less than it was in 1927. Such a remarkable achievement reflects the greatest credit on both the administrative and technical efficiency of the personnel and it emphasizes the wisdom of developing a highly trained personnel by granting the workers satisfactory compensation.

In addition to these routine activities, the Wassermann Laboratory has furnished instruction in serological methods to men in the second year class of the Harvard Medical School; to a special class of eighteen senior students from Simmons College; to three special students in the graduate department of Simmons College; and to eight men from the School of Public Health of Harvard University representing citizens from Belgium, Haiti, India, Italy, Jamaica and the United States.

## REPORT OF DIVISION OF CHILD HYGIENE

M. LUISE DIEZ, M.D., *Director*

The following brief report covers the activities of the Division of Child Hygiene for the year ending November 30, 1931.

### I. Activities of the Various Sections:

1. *Maternal, Infant and Preschool Hygiene:*
  - (a) Maternity Service
  - (b) Well Child Conferences
  - (c) Summer Round-Up
2. *School Hygiene:*
  - (a) Lectures, Classes, etc.
  - (b) Surveys
  - (c) School Hygiene Conferences
  - (d) Hyannis Normal School
  - (e) Fitchburg Normal School
3. *Public Health Nursing:*
  - (a) Institutes
  - (b) Advisory Committee on Public Health Nursing and Social Service
  - (c) Postgraduate Work for Nursing Consultants
  - (d) Mothers' Classes
  - (e) Records
  - (f) Nursing Club Activities
  - (g) Hospital Training School Courses
  - (h) University Extension Courses for Nurses
  - (i) General
4. *Nutrition:*
  - (a) Chadwick Clinics
  - (b) Follow-Up Clinics
  - (c) Summer Camps
  - (d) Nutrition Service to Preschool Conferences
  - (e) Local Chest Clinics
  - (f) Lecture Courses on Nutrition
  - (g) Summer School Courses
  - (h) Natick and Wellesley Demonstrations
  - (i) Consultant Service in Nutrition
  - (j) Nutrition Advisory Committee
5. *Dental Hygiene:*
  - (a) Dental Advisory Committee
  - (b) School Dental Workers
  - (c) Consultation Service
  - (d) Surveys
  - (e) Well Child Conferences
  - (f) Dental Campaign
  - (g) Dental Clinics
6. *Health Education:*
  - (a) Pamphlets, Posters, Exhibits, etc.
  - (l) Library
  - (c) Lectures, Motion Pictures, etc.
  - (d) Prenatal and Postnatal Letters and Letter to Fathers

### II. Special Projects:

1. May Day — Child Health Day
2. 4-H Clubs
3. Tidings
4. Departmental News
5. White House Conference

### III. Personnel of the Division.

## I. ACTIVITIES OF THE VARIOUS SECTIONS

## 1. Maternal, Infant and Preschool Hygiene:

(a) *Maternity Service.*

The prenatal letters, fathers' letters and letters on the care of the baby during its first two years are still in demand and the records show a normal growth in requests for this service. At the close of this fiscal year there were on the registry for all groups — prenatal and postnatal — over 17,200 names of persons as compared with 12,500 last year.

At the request of the local board of health of one of the larger cities, the Pediatrician of the Division made a survey of prenatal, natal and postnatal care facilities available. In addition to this survey one was made of the principal lying-in hospitals of another city to ascertain what is being done in the way of providing prenatal care for patients to be delivered at the particular hospitals concerned.

(b) *Well Child Conferences.*

As a result of the survey of established well child conferences up-to-date information is filed with regard to 214 of these, four such conferences being established in local communities during the year.

During the year the Pediatrician of the Division attended 52 well child conferences in 50 towns and examined 1,902 children. Of this total 27 conferences were held in Franklin County, in 25 towns, and 1,165 children examined. A more detailed account appears later in the report covering the Franklin County project.

(c) *Summer Round-Up.*

During the year 145 towns reported having held Summer Round-Up locally, at which a total of 8,243 children were examined, 2,193 of these children having examinations by their family physicians. The reports received indicate that 4,017 defects were corrected before the children entered school. In addition to the Summer Round-Up carried on by local communities this Division conducted such examinations in 52 towns, including those in Franklin County, at which 730 entering school children were examined. Of the 730 examined, 46 children were found to be without defects. A total of 1,442 defects was found in the remaining 684 children examined.

## 2. School Hygiene:

(a) *Lectures, Classes, etc.*

Much of the time of the Pediatrician engaged in school hygiene work of the Division was spent in lecturing and teaching. The lectures given included twelve to teachers' groups, as part of a course arranged by the Massachusetts Tuberculosis League, one to superintendents of schools in Berkshire County, seven at Boston University, two radio talks, and six to miscellaneous groups.

The teaching service included the usual six-weeks' course at Hyannis State Normal School during the summer, a course of six lessons to teachers in three centers of the State, and a University Extension course of four lectures in another center, to teachers.

(b) *Surveys.*

School hygiene surveys were made in seven towns and a resurvey in three towns. These surveys are always productive of good results, the communities surveyed usually including some or all of the recommendations made.

(c) *School Hygiene Conferences.*

The usual series of six school hygiene conferences was held in the State Normal Schools during the early part of the year, in cooperation with the State Department of Education. These conferences are of value in stimulating local school officials, physicians and nurses to higher standards in school hygiene. The following table gives a total attendance on all conferences of 475 persons:

School Superintendents.....	51	Supervisors of Physical Education .	6
Assistant Superintendent . . . . .	1	Directors of Physical Education . . .	3
School Committee Members. . . . .	5	Assistant Directors of Physical Edu-	
Principals . . . . .	20	cation . . . . .	3
Supervisors of Health Education	3	School Dentists . . . . .	8
Teachers . . . . .	28	Dental Hygienists . . . . .	11
School Physicians . . . . .	19	Dental Assistants . . . . .	4
School Nurses . . . . .	186	Miscellaneous . . . . .	51
Other Public Health Nurses ....	59	State Workers . . . . .	17



(d) *Hyannis Normal School.*

The usual courses were given at Hyannis Normal School for six weeks during the summer, with the exception of that in dental hygiene. What was formerly a dental hygiene series was combined with the course for school nurses, and dental hygienists wishing to complete the courses required for certification were permitted to attend this course. Three lectures on dental hygiene subjects were included in this series. A nutritionist of the Division conducted a two-hour course at Hyannis on nutrition subjects for the school nurses registered for this course. A small exhibit accompanied each lesson and a good deal of printed matter was distributed for future reference. The subjects of the courses conducted by the Division of Child Hygiene were the following:

Factors Which Influence Health  
School Hygiene and Health Education  
School Nursing Procedures  
Relation of Public Health Nursing to Social Service  
Principles of Teaching Health Subjects

The courses were attended by 33 nurses, 26 teachers and 4 dental hygienists.

(e) *Fitchburg Normal School.*

Courses in nutrition subjects were given at Fitchburg Normal School for teachers in Continuation Schools and Evening Vocational Schools. During the first week, the morning class was devoted to teachers of the Trade Schools of the State who desired nutrition training, and whose work was particularly with adolescent girls. Eighteen attended this class, which was conducted as a nutrition clinic for the members, thus affording a working basis for their own better nutrition and aiming to give a knowledge of nutrition to help those in their classes to meet their nutrition and health problems. The afternoon class was a more advanced group and followed the regular nutrition outline. In the second and third weeks of the course both elementary and advanced students followed the same outline.

The fourth week of the course included a class in nutrition for public health nurses. This group had broader nutritional background and with longer class periods was able to accomplish more than the group with a limited nutritional background. Nine nurses attended these classes.

The total number attending all classes conducted by the nutritionist of the Division was 44.

### 3. Public Health Nursing:

(a) *Institutes.*

The Child Hygiene Division, in conjunction with the Massachusetts Tuberculosis League and the Massachusetts Society for Social Hygiene, conducted a three-day Institute for nurses. A feature of this program was the playlet, "A Nurse's Day," written and acted by the staff of the Division, which demonstrated the various activities of a public health nurse according to the most effective, professional and efficient methods. A total of 436 public health nurses registered, representing all sections of the State. The Institutes were held in New Bedford, Boston, Northampton and Worcester.

(b) *Advisory Committee on Public Health Nursing and Social Service.*

The Advisory Committee on Public Health Nursing and Social Service rendered valuable assistance during the year. Several meetings were held for the discussion of matters pertinent to the Divisions of the Department.

(c) *Postgraduate Work for Nursing Consultants.*

Another of the Division's Public Health Nursing Consultants was given the privilege of taking a "refresher" course at East Harlem Nursing and Health Center, New York City, through the generosity of the Rockefeller Foundation. This opportunity for professional improvement has proved its worth in the greater demand for Mothers' Classes and similar activities promoted through nursing service.

(d) *Mothers' Classes.*

Mothers' Classes were conducted by two of the Public Health Nursing Consultants in one of the larger cities of the State, to demonstrate to the local visiting nursing associations how such classes can be carried on locally by such organizations. Much interest was displayed by the board members and nurses of the organization

and by the 17 mothers attending the classes. As a result of this demonstration the local nursing association, through its staff nurses, is now conducting Mothers' Classes in four sections of the city.

A similar demonstration was held in one of the larger towns, 13 mothers attending, where it is planned to carry on such classes in other sections of the town, through the nursing association.

(e) *Records.*

Improvement has been evident in the matter of record keeping on the part of the local nurses. During the year a "Daily and Monthly Report of School Nurse" form was printed and distributed to local school departments for the use of the school nurses. Many of the towns are using this record form and find it helpful. This at least marks a step forward in the matter of uniformity in record keeping.

(f) *Nursing Club Activities.*

The Nurses' Clubs still continue to carry on actively and hold regular monthly meetings for which the Department Nursing Consultants assist in arranging timely programs and securing speakers.

(g) *Hospital Training School Courses.*

Two of the Public Health Nursing Consultants gave courses in Public Health Nursing in the nurse training schools in ten of the hospitals within their districts, which included a total of 238 nurses. The demand for such courses continues to grow and each year we are asked to repeat the courses for the newer student nurses.

(h) *University Extension Courses for Nurses.*

We are continuing to offer local public health nurses an opportunity to take the Extension Course sponsored by the New York University and New York Department of Health, the courses this year being carried on by one of the Division Public Health Nursing Consultants instead of the Department Consultant in Public Health Nursing. During the year such courses were held in Boston, Fitchburg, Holyoke, Springfield and Worcester. In all, 62 monthly conferences were held at which 92 nurses attended. Plans have been discussed with the Department of Education for the consideration of having such a course available through the Massachusetts Division of University Extension.

(i) *General.*

Nutrition courses for public health nurses have been continued throughout the year by the Consultant in Nutrition of the Division. Increased interest and attendance are evident.

Although the staff of the Division has been increased by the addition of another Public Health Nursing Consultant, it is felt that there is need for at least two more such consultants. For some time it has been evident that the districts covered by the nursing consultants have been too large and scattered. This has been improved somewhat by the reorganization of districts into smaller numbers and so arranged that travel will be facilitated, but with the numbers now arranged there is still an overcrowded program to be carried on by each nurse, particularly in view of the reorganized nursing program of the entire department for the coming year. The nursing consultants will no longer confine their activities to matters pertinent to the Division of Child Hygiene alone but will have a generalized program in place of a specialized one, to include tuberculosis and communicable disease activities in addition to their present duties.

#### 4. Nutrition:

(a) *Chadwick Clinics.*

Nutrition service for the Chadwick Clinics has been given by the nutrition staff as in former years. The children examined at the clinics were interviewed with regard to food and health habits and home visits were made by the nutritionists to secure the cooperation of the parents in carrying out the recommendations made by the nutrition workers.

(b) *Follow-Up Clinics.*

Two nutritionists carried on this work during the year. The large numbers of children examined required constant work in family visits and clinic interviews. Because of the transfer of the three nutritionists from the Division of Child Hygiene to the Division of Tuberculosis in the middle of the year, a reorganization of the plan of work was instituted.

(c) *Summer Camps.*

This project was continued during the year, one nutrition worker visiting 16 summer camps which had requested this service early in the year. While no visit was made to several other camps, advice regarding menus, food costs, etc., was given by the nutritionist.

(d) *Nutrition Service to Preschool Conference.*

The plan of offering the services of a nutrition worker to established local well child conferences was furthered this year, and we continue the services of a nutritionist at all well child conferences held by the Division staff as demonstration conferences in local communities. During the year such service was rendered to 76 such conferences.

(e) *Local Chest Clinics.*

Nutrition service was carried on at the local chest clinics in Milford, Framingham and Walpole. These are tuberculosis consultation clinics to which local physicians refer patients. The purpose of this service was threefold: first, to instruct the patient in the matter of suitable diet; second, to teach the local nurse nutrition facts through attendance at these conferences; and third, to assist her in the nutrition follow-up — all tending to demonstrate what part a nutritionist may take in tuberculosis as part of a community program. In instances where clinics were held in schools the domestic science teachers were contacted with a view to teaching the students proper nutrition in relation to tuberculosis.

(f) *Lecture Courses on Nutrition.*

Nutrition courses for teachers were given in nine communities in the State as a part of a series instituted by the Massachusetts Tuberculosis League. Nutrition courses for nurses were held also in which interest in nutrition was keen. The Consultant in Nutrition gave 27 talks during the year to a total of 794 persons.

(g) *Summer School Courses.*

A two-hour course in Nutrition, for school nurses, was conducted by a Public Health Nutrition Worker of the Division at Hyannis Normal School over a period of six weeks. Because of the change in plan of courses for this year an entirely new outline had to be prepared to adapt the large amount of material to the shortened period for classes.

At Fitchburg Normal School another course was given by one of the Public Health Nutrition Workers who had been transferred to the Division of Tuberculosis, but who had been scheduled to give this course before the transfer was made. This course was for continuation school teachers and vocational teachers in evening schools.

(h) *Natick and Wellesley Demonstrations.*

This project was completed during 1931 and a final summary and recommendations for future work in these communities were prepared. This work included 427 home visits to 236 families. In Wellesley, fourteen weekly classes were held, from the kindergarten through the sixth grade, with a total of about 400 children. In Natick two classes were held daily with about 30 children in attendance. It is hoped that a part-time nutritionist may be employed to carry on this work.

(i) *Consultant Service in Nutrition.*

The services of the Nutrition Consultant are available, as usual, to communities, for special problems such as the school lunch, and to any organization requesting particular advice regarding nutrition. We continue to offer assistance to the State institutions with regard to suitable food for patients and inmates, rendering this service to state institutions other than the sanatoria and hospitals under the Department of Public Health.

(j) *Nutrition Advisory Committee.*

In keeping with the policy of the Department to seek the best advice of specialists in a given field, a Nutrition Advisory Committee was formed during the year to consult with the Department in matters of nutrition service to communities. This Committee rendered valuable assistance when called upon.

## 5. Dental Hygiene:

Upon reviewing the dental hygiene activities of the year we note that 48 more towns sent in annual reports than in 1930; 39,319 more children received dental certificates than in the previous year, a total of 130,155 children, or 25% of the



elementary school population. Several towns started dental clinic service and others extended dental clinic service to preschool children.

(a) *Dental Advisory Committee.*

The Dental Advisory Committee met twice during the year, once with the Dental Hygiene Council. At one of these meetings the plan for appointing a part-time Consultant in Dentistry to the Department of Public Health was approved. Valuable assistance was rendered also in the matter of deciding the state dental policy for the Department, the recording of dental defects on the required school medical record card, postgraduate courses for dental hygienists contemplating public health positions, and the dental hygiene pamphlets of the Department.

(b) *Association of School Dental Workers.*

This Association comprised of school dentists, dental hygienists, school nurses, boards of health and superintendents of schools, was organized in 1927 and has been actively interested in school dental matters since. The Bulletin is issued to a mailing list of about 1,600 persons and seven issues were sent out during the year.

(c) *Consultation Service.*

The Consultant in Dental Hygiene has assisted in establishing dental programs in 11 towns of the State; has helped to secure dental equipment for 12 communities, and made suggestions for improvement in the dental service in 42 towns, as well as consulting with the dental hygienists in 22 towns seeking assistance with their problems. She was instrumental also in securing the services of a dental clinician for 27 towns and a dental hygienist for 8 towns.

(d) *Surveys.*

A survey was made of the dental work in the State Sanatoria at North Reading, Lakeville and Westfield to check up on recommendations made as a result of a survey in 1929. As a result of this a Study Club was formed made up of the four dentists, to meet three times a year for the discussion of their problems. It was recommended also that the incidence of dental caries at the Sanatoria be studied and an attempt made to reduce such caries by change in diet. Through the assistance of Forsyth Dental Infirmary plans have been completed for beginning such a study the beginning of next year.

A survey was made of the needs of the towns in the Berkshire Health Unit with regard to dental service, and a program for adequate dental service has been completed and launched.

(e) *Well Child Conferences.*

A careful dental examination and a conference with the parent with regard to care of the teeth have been part of the Department's demonstration well child conferences throughout the year. In 39 towns, 1,175 dental examinations were made by the Dental Hygiene Consultant. In the conferences in Franklin County alone 684 children were examined, of which 317, or about 50% were apparently without caries.

(f) *Dental Campaign.*

The number of towns reporting the number of children receiving dental certificates increased 27% over the previous year. The number of children receiving dental certificates increased 43% over the previous year.

(g) *Dental Clinics.*

Dental clinics to the number of 230 are now being carried on locally, 140 by official agencies and 90 by private organizations.

There has been a slight decrease in the number of school dentists employed, 249 being employed during the year. Fifty-two communities employed dental hygienists, 34 on full time and 18 on part time.

## 6. Health Education:

(a) *Pamphlets, Posters, Exhibits, etc.*

The printing of pamphlets during the year totalled 2,917,900 pieces. In addition, there were printed 29,500 copies of The Commonwealth, the quarterly publication of the Department.

Included in the distribution of pamphlets have been various leaflets received from other Divisions of the Department. Four new leaflets were added during the



year — Care of the Child in Cold Weather, Sensible Sun Baths, Teaching the Child to Brush His Teeth, and Weight by Years for Boys and Girls 7 to 14.

Material was mailed to all but four States in the Union. New York led with 74 requests, followed by Michigan with 38; California, 33; Pennsylvania, 31; Illinois, 28; and Connecticut, 27. The total of requests from all other States than Massachusetts was 437.

Outside the United States there were 26 requests from Canada; 14 from South Africa; 3 each from England, India, Hawaii and the Philippine Islands; 2 from Roumania, and one each from Germany, Sweden, Italy, Costa Rica, Brazil, New Zealand, Japan, Central America, China, Canal Zone — 64 in all.

To fill requests for Child Health Day material 659,229 pieces of printed matter were sent out; Summer Round-Up material totalled to 195,408 pieces; and all other material for the usual orders amounted to 587,392 pieces; — a grand total of 1,442,029 pieces of printed matter sent out during the past year. Included in this total were 372,600 pieces of printed matter requested from teachers cooperating in the campaign of health education through correlation with art work in the schools.

The Health Education Worker executed 31 new illustrations and 37 charts, the latter for Divisions other than Child Hygiene. Because of the necessity of devoting so much time to constructive art work, the campaign in the schools was kept at a lower level than usual.

#### (b) *Library.*

To maintain a suitable reference library for the use of the Department staff there were purchased during the year 148 books and pamphlets; for reference use at the Hyannis Normal School during the summer courses of the Department it was necessary to buy 311 books, for Fitchburg Normal School course one was purchased, and for special exhibit use 22 books were bought. Renewals of regular subscriptions numbered 90 and subscriptions to new journals were obtained to the number of eight. Four issues of the quarterly bulletin, *The Commonwealth*, were printed during the year, and all were special numbers devoted to Public Health Nursing, *The Business Woman*, Sanitation and Lobar Pneumonia. 1,000 extra copies of *The Business Woman* number were printed for the use of the Division of Adult Hygiene, and 8,500 extra copies of the *Lobar Pneumonia* number were printed for the use of the staff conducting the pneumonia study. The total expense for library purposes was \$6,682.

An author and title card catalogue of all books in the library was one of the steps forward this year and it is planned for the coming year to make a cross index according to subject matter to fill a long felt need.

The complete rearrangement of the library not only added to the appearance of the library but secured a more efficient working arrangement.

Approximately 300 new names were added to the mailing list for *The Commonwealth*. This bulletin is sent to 310 persons living outside the State and to 60 in other countries.

#### (c) *Lectures, Motion Pictures, etc.*

During the year a total of 892 lectures and 151 radio broadcasts were given by 51 members of the Department staff and 73 outside speakers secured for the Department programs. Of the 355 communities in the State 185 were contacted with lecture service, reaching approximately 56,224 persons. Talks by the staff of the Child Hygiene Division head the list, there being a total of 381 given. The regular speaker secured through the Massachusetts Society for Social Hygiene gave 190 lectures and one radio broadcast on social hygiene subjects, in 87 communities, reaching about 14,998 persons.

Motion pictures were loaned to 54 communities and delineascope film-slides were loaned for use in 60 communities of the State.

Posters were loaned to 57 communities, particularly those for use in the classroom and at well child conferences.

The exhibits of the Department have been completely reorganized and supplemented with up-to-date material. There are now completed exhibits on *The Healthy Baby*, *The Expectant Mother* and *The Preschool Child*. The School Hygiene and Dental Hygiene exhibits are nearing completion and new food models have been purchased for a Nutrition exhibit.

*(d) Prenatal and Postnatal Letters and Fathers' Letter.*

During the year there were 5,425 new requests for prenatal letters and 5,721 for postnatal letters. At the end of the fiscal year there were on the registry receiving monthly letters a total of over 700 for prenatal, 9,040 for the first year postnatal and 7,500 for the second year postnatal letters. The fathers' letter was sent to all the families from which requests for prenatal letters were received, a total of 5,425 for the year.

## II. SPECIAL PROJECTS

**1. May Day—Child Health Day:**

Three demonstrations of Child Health Day material were held in Ware, Beverly and Plymouth. Nine newspaper releases were prepared in connection with this activity. A pageant "The Health of America" and a pantomime "The Toy Shop" were prepared for use in this celebration. May Day material was ordered by 270 towns and 118 reported on celebrations held locally. Physically Fit tags were awarded to 15,900 children in this campaign, 42,210 received Improvement tags, and 25,116 received the Teeth tag.

**2. 4-H Clubs:**

Greater interest on the part of the 4-H Club leaders and members has been evident this year, the Health Contest helping considerably in this. A definite gain in health interest is noted in this group and the Health Education Worker carrying on this project feels it was the most worth-while piece of work accomplished in her field during the year.

**3. Tidings:**

The revival of Tidings was undertaken last year and continued throughout the year just passed, being issued bi-monthly. From the comments received it is observed that it fills a need and in its new form is of more value.

**4. Departmental News:**

To fill a long felt need for a bulletin within the Department that would give informational service to all Divisions, a monthly sheet called "Departmental News" was prepared. Representatives from each Division were selected to submit to the editor items of interest for inclusion in this monthly bulletin. Favorable comments have been received concerning this bulletin.

**5. White House Conference:**

The personnel of the Division gave assistance in the preparation of material for the Massachusetts White House Conference Committee and served as lecturers for this Committee when occasion required.

## III. PERSONNEL OF THE DIVISION

During the year there were several changes in the staff of the Division due to resignations and reorganization of the work in connection with the Chadwick Clinics.

Miss Mary Spalding was appointed early in October to fill the vacancy caused by the resignation of Mrs. Esther Erickson Baldwin, former Consultant in Nutrition.

Miss Mildred Swift was appointed in the fall to succeed Mrs. Evelyn Smith Sheerin, as Public Health Nutrition Worker.

Because of the redistricting of the cities and towns into smaller and more compact districts, Miss Aura Kepler was appointed as Public Health Nursing Consultant for the newly formed district.

To fill vacancies in the clerical staff Margaret Reardon, Alma Recke and Mary T. Whelan were appointed.

In June of this year the general plan for the conduct of the Chadwick and Follow-Up Clinics was changed and three Public Health Nutrition Workers employed in the Division of Child Hygiene were transferred to the Division of Tuberculosis — Miss Emma Wetherbee, Miss Lillian Stuart and Miss Nancy Jordan. The latter resigned her position shortly after the transfer was made and the vacancy in that position is now filled by Miss Katherine Leamy, Public Health Nutrition Worker.

The Division staff now consists of the Director, two Child Welfare Physicians, a Department Consultant in Public Health Nursing, five Public Health Nursing Consultants, a part-time Public Health Nursing Consultant, a Public Health Nutrition Consultant, two Public Health Nutrition Workers, a Public Health Dental Hygiene Supervisor, two Health Education Workers, thirteen stenographers and clerks and one junior messenger. In addition to the above it was necessary to employ for temporary periods during the year, fourteen junior clerks and stenographers, one junior messenger, two conference physicians and a dental hygienist, because of special projects such as Child Health Day, Summer Round-Up, Well Child Conferences and exhibits at special meetings. At Hyannis Normal School two special instructors were employed for the Summer Courses for nurses and teachers.



## REPORT OF THE DIVISION OF COMMUNICABLE DISEASES

GAYLORD W. ANDERSON, M.D., *Director*  
NELS A. NELSON, M.D., *Assistant Director*  
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## GENERAL STATEMENT

During the year 1931, 89,954 cases of communicable disease were reported to this Department as compared with 101,179 for 1930. This decrease of approximately 11 per cent was due in large part to the lessened prevalence of measles and whooping cough. Lower case and death rates than ever previously recorded for diphtheria, pulmonary tuberculosis and typhoid fever were outstanding features of the year. Infantile paralysis was the only disease to reach serious epidemic proportions.

## PREVALENCE OF SPECIAL DISEASES

*Anterior Poliomyelitis.* — The past year has seen, with the exception of 1916, the worst epidemic of infantile paralysis recorded in Massachusetts, with 1,428 cases and 114 deaths reported. Only Connecticut and New York experienced a higher incidence of the disease than did this State. The Massachusetts outbreak, which was but part of an epidemic wave extending over the entire northeastern corner of the United States, was, as elsewhere, somewhat milder in its nature than in previous years. Beginning in New York the middle of July, the wave swept northward, reaching its height in this State about the first of September and affecting particularly the Connecticut Valley. That the Northeastern and Metropolitan areas of the State had been severely affected during 1930 probably accounts in large part for the fact that the disease, while prevalent, did not reach epidemic proportions in these areas. The disease appeared somewhat later in Worcester County and was particularly prevalent in Leominster and Fitchburg during September and October.

In order to cope with the situation, two emergency appropriations of \$5,000 each were obtained from His Excellency, the Governor. With this to supplement the resources of the Department, the following services were set up in cooperation with the Harvard Infantile Paralysis Commission.

1. The Department took over the entire responsibility for the collecting and processing of blood for the production of convalescent serum. In cooperation with local boards of health, clinics for the collection of blood were held in Ayer, Boston, Brockton, Cambridge, Fall River, Fitchburg, Framingham, Greenfield, Haverhill, Holyoke, Lawrence, Lowell, Lynn, Malden, Milford, New Bedford, Newburyport, Newton, North Adams, Northampton, Northbridge, Pittsfield, Quincy, Salem, Springfield, Waltham, Watertown, Webster and Worcester. Six hundred and twenty volunteers came to these clinics and blood was obtained from 427. During the summer 120 liters of blood were obtained, making serum enough to treat some 700 patients. At no time during the summer was the State ever asked to pay for any of the blood so obtained, a remarkable tribute to the unselfish public spiritedness of the citizens.

2. The full-time services of two members of the staff were made available in the Connecticut Valley to supplement the diagnostic and serum service offered through the Commission.

3. The full-time services of two physicians were engaged for two months to supplement the service in the Connecticut Valley.

4. Part-time services of three additional physicians were engaged to supplement the service of the Commission around the eastern section of the State. In addition, the part-time services of the health officers of the Southern Berkshire and Nashoba Districts were made available for service in their portions of the State.

5. For several months during the epidemic, the diagnostic consultant service of the Commission supplemented by the Department was available in the Connecticut Valley, using the home of the State District Health Officer, Dr. Harold E. Miner, as headquarters. A second station was set up in Greenfield for a portion of the time. Twenty-four hour service was made available through the stations in Holyoke and Greenfield, as well as from Great Barrington, Ayer and the Boston office.

6. Assistance was given to the orthopedic follow-up clinics of the Commission in making arrangements for their conduct of examination clinics in the following communities: Brockton, Fall River, Greenfield, Haverhill, Holyoke, Leominster, New Bedford, North Adams, Northampton, Pittsfield, Quincy, Springfield and Worcester. The purpose of these clinics was to determine so far as possible the severity of the epidemic and the value of convalescent serum, as well as to consult with physicians as to care of such cases.

During the year 1,228 calls to 775 cases were made in conjunction with the Harvard Infantile Paralysis Commission. These were distributed as follows:

County	Cases Reported	Cases Seen	Per Cent Seen	Total Visits
Barnstable . . . . .	20	10	50	17
Berkshire . . . . .	45	21	47	23
Bristol . . . . .	80	36	45	50
Dukes . . . . .	0	0	0	0
Essex . . . . .	91	53	58	107
Franklin . . . . .	68	59	87	82
Hampden . . . . .	228	158	69	235
Hampshire . . . . .	107	95	89	164
Middlesex . . . . .	226	118	52	219
Nantucket . . . . .	2	0	0	0
Norfolk . . . . .	105	46	44	80
Plymouth . . . . .	84	31	37	37
Suffolk . . . . .	200	68	34	109
Worcester . . . . .	172	80	47	105
	1,428	775	54	1,228

*Diphtheria.* — The marked decrease in diphtheria which had been noted during the preceding year was continued and accentuated during 1931. Only 2,381 cases of the disease were reported, as contrasted with 3,322 for the previous year, making a case rate of 56. The deaths fell to 130 with a mortality rate of 3.0, which is but 70 per cent of that for 1930 and but 50 per cent of the rate for 1929. The fatality rate of 5.4 is the lowest ever recorded, suggesting possibly a milder form of the disease.

As the year ends, diphtheria is distinctly more prevalent over the country as a whole, especially in the Middle West and South. In the northeastern corner of the United States and particularly in this State there has been little sign of the increased prevalence. The true test of the community value of diphtheria immunization will come when it is determined whether or not the State experiences this increase, which is fairly widespread, and if it does so experience it, whether or not those better immunized communities are able to keep their diphtheria rates low.

The decrease in incidence in Massachusetts has been very general but has been particularly significant in the Connecticut Valley. The only communities which have shown a material increase in diphtheria have been Everett, Malden and Taunton. The diphtheria immunization programs which have been begun in previous years have been continued and expanded so that during 1931 more communities have conducted such work than in any previous year. The outstanding program of the year was that carried on in Springfield, where about 13,000 children were immunized. Somerville is now carrying on its first immunization program and is having a very large attendance at its clinics. There is an increasing realization and appreciation of the value of the immunization of the preschool children and many communities have been able to reach an appreciable proportion of this group.

*Epidemic Cerebrospinal Meningitis.* — Massachusetts has, during the past year, experienced the same decrease in epidemic cerebrospinal meningitis which has been noted in virtually all sections of the country. With only 101 cases reported as contrasted with 174 for the previous year, the State figures reach next to the lowest level ever recorded. There were 30 deaths, making a mortality rate of 0.7, which is the lowest on record.

The diagnostic service which was instituted the previous year, in anticipation of a marked increase in meningitis, was continued until December 1st. During this time only 11 requests came to the Department for such service and in but two of these was a diagnosis of meningitis made. In view of the lack of demand for the service, it has been discontinued as of December 1st and special arrangements made so as to continue the work with the services of the regular staff of the Department.

*Influenza.* — During January and February, largely owing to newspaper reports of influenza from other sections of the country, there was considerable apprehension lest an influenza wave might appear in this State. During this time a certain number of cases were reported, though their distribution suggested that many of the cases that were elsewhere considered grippe and upper respiratory infections were in certain communities diagnosed as influenza. Whatever may have been the correct diagnosis, no material increases in pneumonia cases or deaths were recorded to bear out the suggestion of the existence of real influenza. At the time of the apparent prevalence, numerous surveys of the State were made, relying largely upon the findings in schools, of the visiting nursing associations and the hospitals. The surveys constantly showed that although in some communities there was a fairly high prevalence of upper respiratory conditions with certain systemic manifestations, in general there was little to suggest the existence of influenza as seen in pandemic times. There were 1,235 cases reported and 427 deaths.

*Malaria.* — Only 18 cases of malaria were reported as compared with 42 for 1930. Of these, 5 were therapeutic, 1 apparently contracted his infection within the State, and the others unquestionably were infected outside of Massachusetts. A large proportion of these were sailors hospitalized at the Chelsea Naval Hospital, having been brought there from ships which had recently returned from the tropics.

*Measles.* — During 1931, 16,581 cases of measles were reported as compared with 27,137 for 1930. The disease reached a high level within the Merrimack Valley and the region around New Bedford during the spring. As the year closes, it is distinctly prevalent in Lynn and surrounding communities, with another focus developing in the northern portion of the Connecticut Valley.

During the year the Division recircularized all physicians in the State, calling their attention to the use of parental whole blood for the prevention and modification of measles among exposed contacts and announcing the planned distribution of sodium citrate solution which might be used to delay the clotting of blood in this connection.

*Rabies.* — Four human deaths from rabies occurred during 1931 following bites inflicted upon residents of Millbury, Waltham, Watertown and Westboro. None of these patients had had antirabic treatment.

The laboratory reported during the year 304 animal heads as positive for rabies as compared with 310 for the previous year. 6,878 cases of dog bite were reported as compared with 5,189 for 1930.

In June it was apparent that in areas centering around Boston, Holyoke, Pittsfield and Worcester the prevalence of rabies was distinctly increased over that of the previous year and as a consequence all communities were requested to pass orders restraining all dogs for a period of three months, beginning July 1st. Ninety-nine communities cooperated with the State in this endeavor. Much might have been accomplished from this program had it not been for the refusal of the leading communities in all these areas, except Pittsfield, to cooperate. That little improvement in the rabies situation can be shown is hardly surprising. In Pittsfield, however, marked improvement resulted and a small focus around Greenfield was completely wiped out. Unfortunately, the quarantine in Pittsfield was not maintained for a long enough period, so that the temporary improvement has not been maintained and as the year closes there are already signs of reappearance of the disease. It seems apparent at this time that so long as the authority to promulgate and enforce restraining orders rests with 355 different governmental bodies, little can be accomplished through such cooperative plans for restraint. The conscientious, interested community may have its endeavors completely nullified through the apathy of an uncooperative neighbor.

It would seem that probably far more will be accomplished in the future by devoting the same amount of energy to the active support of programs for anti-



rabies vaccination of dogs, even though it is recognized that such a method is not completely effective. Certainly, it leaves some permanent influence on the community, whereas restraint orders do not.

*Scarlet Fever.* There were 12,782 cases of scarlet fever reported as compared with 9,408 for 1930. The number of deaths increased from 98 in 1930 to 101, making a case fatality rate of 0.8 per cent.

Scarlet fever has been and still is a very troublesome problem for health departments owing to the present high incidence of extremely mild forms of the disease. These forms are so mild that in many instances children continue to attend school unsuspected and thereby keep the disease alive in their respective communities. The apparent increased prevalence of the disease is partly due to this factor, and perhaps in part to improved reporting.

*Septic Sore Throat.* This disease was reported 226 times as compared with 422 for 1930. Most of these were sporadic in nature. One small outbreak occurred in the town of Marion, accounting for but 17 cases, spread through milk from a cow which on slaughter was shown to have an udder abscess from which hemolytic streptococci were cultured. It is particularly unfortunate that this epidemic in Marion, which except for the fact that the greater portion of the milk was being pasteurized might have reached serious proportions, was not followed by local adoption of any measures which would prevent a repetition of that experience. A comparable outbreak of but ten cases occurred in Wareham, due to the sale of raw milk from a dairy in Middleboro. Here again hemolytic streptococci were found in the throats of the patients, in pooled samples of milk and finally in samples taken from a cow showing evidence of mastitis.

*Smallpox.* Six cases of smallpox were reported, all in connection with a small outbreak centering around Williamstown and due to a visit by a patient from New York who was sick with what was later diagnosed as smallpox. Five of the cases were among unvaccinated members of a family in which he visited, the exemption certificates which enabled these children to attend school being no protection against smallpox. The sixth case was in the person of an unvaccinated man who was in contact with the patient at a dance. Of the thirty-four other persons at the dance, all of whom had been vaccinated, none contracted the disease. Extensive vaccination in Williamstown and surrounding communities prevented further spread.

*Tuberculosis, Pulmonary.* There were 4,421 cases of pulmonary tuberculosis reported as compared with 4,696 for last year. This makes 1931 the lowest year on record for such cases. Similarly, 2,306 deaths were reported as compared with 2,423 for last year, making a death rate of 53.9, which is likewise lower than ever previously reported.

*Typhoid Fever.* A marked decrease in typhoid fever was noted with only 250 cases reported as compared with 318 for last year. The previous low record was 307 in 1929, making a decrease of 19 per cent for this year. The number of deaths has fallen from 38 last year to only 30; the death rate was 0.7, the lowest ever recorded in this State. The decrease experienced for the year was in part due to a great freedom from outbreaks of any magnitude and also in part due to an actual decrease in the endemic incidence of typhoid.

Following two years of freedom from milk-borne typhoid, three separate instances were reported this past year. In two of these a single case of typhoid was unquestionably caused by milk from a one-cow supply, in one instance infected by a carrier, in the other by a mild unrecognized case of the disease. Stockbridge and Lee experienced an outbreak of 28 cases (16 reported during 1931, others in 1932), caused by the consumption of raw milk infected by a carrier.

Of the 250 cases reported, the source of infection was detected in 46 instances. Of these, 11 per cent were traced to food infected by a carrier, 24 per cent to contact with carriers, 26 per cent to contact with known cases and 39 per cent to milk.

With the addition of seven new names, the list of known typhoid carriers now numbers 66. Of those newly found, two were on the basis of cultures taken during their convalescence; two were visitors to the State at the time of their discovery and shortly afterward returned to their homes in Canada and Maine, respectively:

and one, a carrier who had previously been on our list, moved to New Jersey and then returned to Massachusetts. Operations for removal of the gall bladder were performed at State expense on two proven carriers. Neither of these has been followed long enough so that he may be removed from the carrier list, but in both instances cultures taken from them since operation have been consistently negative for typhoid organisms.

*Undulant Fever.* Fifteen cases of undulant fever were reported as compared with only 6 for last year. This increase is probably due in large part to better recognition of the condition. There is, however, little evidence that the disease is going to approach the relatively high incidence which is being found in the Middle West.

*Whooping Cough.* This disease was reported 7,174 times as compared with 10,750 for 1930. Only 88 deaths were reported as compared with 182 for last year. This makes the lowest number of whooping cough deaths ever recorded in this State, the previous low figure being 137 in 1929. A popular flyer about whooping cough has been prepared and should be ready for distribution early in the new year.

### OUTBREAKS

*January.*—Smallpox; Williamstown. Man from New York with "eruptions" visited relations; five cases in family of six; one case among 35 persons at a dance; two cases in family of 4 in Bennington, Vermont, where he also visited. Every vaccinated person in two families and among those at dance escaped; every one unvaccinated took disease; no deaths.

*January.*—Gastro-enteritis; Wakefield. Mild diarrhoea lasting 12-48 hours following church supper. Not traced to any one article served, etiology not determinable. Between 200-300 out of 488 at supper affected; no deaths.

*January-February.*—Scarlet Fever; Peabody. Eleven cases during 30 days in private school. Source of first case not determined. School closed against advice. No deaths.

*March.*—Gastro-enteritis; Cohasset. Explosive outbreak lasting a week. Water suspected but chemical and bacteriological examination revealed nothing abnormal. Five hundred cases; no deaths.

*April.*—Trichinosis; Chicopee. Two cases in one family. Pork sent in for examination heavily infested with *Trichinella spiralis*. No deaths.

*May.*—Trichinosis; Framingham. Three cases in 3 families in a German colony where raw hamburger and sausages were frequently eaten. No deaths.

*May.*—Typhoid Fever; Seekonk. Five children infected by grandmother from Canada who was a carrier. A neighbor's child who drank milk bought from family also developed typhoid. No deaths.

*June.*—Typhoid Fever; East Bridgewater. One case of milk-borne typhoid. Child drank raw milk on physician's order. All other milk from same supply (one-cow dairy) boiled before use. Milker found to have had light case of typhoid.

*July.*—Pink-eye; Boxford. Fifty-nine cases developed in five days. Isolation and treatment prevented further spread.

*July.*—Streptococcic Sore Throat; Sharon. Nineteen cases of sore throat appeared over one week-end in a summer camp. Source of infection not determined, probably a carrier.

*August.*—Streptococcic Sore Throat; Marion. Milk-borne outbreak. All cases except three used raw milk from same dealer. Epidemiological evidence pointed to one cow, in udder of which was found abscess containing hemolytic streptococci. Seventeen cases, no deaths.

*August.*—Scarlet Fever; Boxford. Five cases developed within three weeks in a summer camp. Strict isolation and subsequent dismissal from camp prevented further spread.

*September.*—Typhoid Fever; Wakefield. Four cases in one family within 6 weeks. Housekeeper found to be a carrier, apparently in the late convalescent period of an unrecognized case. No deaths.

*September-October.*—Diphtheria; Peabody. 25 cases appeared within a few weeks among unimmunized children in small school. Immunized children escaped.

*October.*—Typhoid Fever; Dennisport. Three cases in a construction camp of 14 workmen. Cook found to be a carrier. Outbreak preceded by gastro-intestinal disturbance among most of workmen. No deaths.

*December.*—Streptococcic Sore Throat; Wareham. Ten cases on single raw milk route. Throat cultures showed hemolytic streptococci. Hemolytic streptococci also found in milk from cow showing mastitis. No deaths.

*December.*—Typhoid; Stockbridge and Lee. Twenty-eight cases (16 reported in 1931, 12 in 1932), of which three were contact infections, occurred on raw milk route of 40 quarts. Farmer's wife found to be carrier. Milk probably infected through bottles washed by hand by this carrier. Two deaths.

### GONORRHEA AND SYPHILIS

It is encouraging to discover that there has been no less cooperation from physicians during this second year under the new regulations for reporting gonorrhea and syphilis. Although 410 physicians who reported one or two cases in 1930 failed to report any cases in 1931, 419 new physicians reported cases. The 1,092 physicians who reported in 1931, therefore, represent a net gain of 19 physicians. Of these 1,092 physicians, 886 reported gonorrhea and 516 reported syphilis, as compared to exactly the same number, 886, reporting gonorrhea in 1930 but only 474 reporting syphilis during that year.

There was an increase in cases of gonorrhea reported from 6,974 in 1930 to 7,201 in 1931 and in cases of syphilis from 4,197 in 1930 to 4,447 in 1931 (Table XII).

There were 168 deaths from syphilis at a death rate per 100,000 population of 3.9 and a fatality rate of 3.8. Including deaths from general paralysis and tabes dorsalis, a total of 378 deaths from syphilis were recorded, at a rate of 8.8 per 100,000 population (Table XIII).

Of the 355 communities in the State, only 86 reported no cases of either gonorrhea or syphilis, as compared to 98 in 1930 and 257 in 1929. Only one of these 86 communities was over 5,000 population and only 30 were over 1,000 population.

No new clinics for the treatment of gonorrhea or syphilis were opened during the year, nor were any of the old ones closed. The 14 clinics aided by this Department admitted 2,207 new cases of syphilis and 2,742 new cases of gonorrhea during the year; a total of 4,947 as compared to 4,960 in 1930. New admissions for syphilis declined from 2,462 in 1930, while those for gonorrhea increased from 2,498 in 1930. These patients made 183,638 visits, a decline from 190,535 in 1930 (Table XIV).

The two-year experiment in social work at the Lowell Clinic has now become a permanent service. The support given the experiment by the Massachusetts Society for Social Hygiene and the additional aid given during the last three years by this Department have been withdrawn so that the cost of conducting this service has now been absorbed by the Lowell Board of Health. With this release of funds it has been possible to plan for the further development of the clinic at Fall River during the coming year.

Local boards of health over the State have assumed even greater responsibility than during the record-breaking year of 1930 for the follow-up of cases which had prematurely discontinued treatment. One hundred and forty-one boards of health followed 2,968 cases as compared to 2,476 last year. The proportion of the lapsed cases which could be found was almost exactly the same as for 1930, at 48 per cent. In Boston 39.1 per cent of the cases were located as compared to 35.6 per cent last year.

Dr. Henry M. DeWolfe, Epidemiologist of the Subdivision, continued to visit physicians throughout the State, except for nearly three and a half months when he acted as district health officer in the Worcester District. He has now visited nearly 1,000 physicians, the results of which visits will be reported in the near future.

The total distribution of arsenicals increased nearly 5,000 grams to the high total of 49,898 grams. By far the greater part of this increase (4,700 grams) was in the distribution of neoarsphenamine. Arsenicals were distributed to 335 physicians, 149 of whom were new additions to our list of 663 physicians using State arsenicals. As noted during the previous year, less than 50 per cent of the physicians using State arsenicals reported syphilis (Tables XV and XVI).



The Wassermann Laboratory reported 97,444 blood and spinal fluid examinations for syphilis and the Bacteriological Laboratory reported 8,510 smears examined for gonorrhea.

During the year nearly 215 lectures were given by members of the personnel of the Subdivision. All types of professional and non-professional groups were reached, such as physicians, nurses, medical students, social workers, high school and college students, as well as club groups and special public meetings.

During the year nearly 60,000 pieces of literature were distributed by this Subdivision, some 15,000 or 16,000 of which were of a technical nature for physicians. Following is a list of new publications prepared by the Department for distribution:

- (1) Minimum Standards for the Diagnosis, Treatment and Control of Gonorrhea.
- (2) Information for Women with Gonorrhea.
- (3) Second editions of Information for Men with Gonorrhea and Information for the Patient with Syphilis.

The Department is appreciative of the time and thought which many physicians in the State have given in consultation over its technical literature and is encouraged by the evidence of increasing interest on the part of the medical profession in the management of gonorrhea.

### LOBAR PNEUMONIA STUDY

Lobar pneumonia each year ranks as one of the principal causes of death. When it is further considered that many of the deaths are in that age group at which physical vigor and economic value are at their height, we then obtain some appreciation of the magnitude of the problem which pneumonia presents.

Among the many attempts which have been made to reduce the toll from pneumonia, treatment with concentrated antibody solution has offered the greatest hope for success. For several years the Department has produced a small amount of this material for experimental use in certain hospitals. The results have been sufficiently encouraging to make continuation desirable, yet the cost has been all but prohibitive. There has been the further drawback that most hospital cases are admitted so late in the disease that the most favorable time for serum treatment has already passed.

Through the generosity of the Commonwealth Fund of New York City, funds have been made available to the Department which have permitted or continuation of serum production and the development of a program by which a controlled study can be made of the efficacy of the serum in the early treatment of lobar pneumonia outside of the hospitals. Coincidental with this program has been a study of such other aspects of lobar pneumonia as may have bearing on possible control measures. The studies were begun the first of February and as the year ends, have been brought to such a point that the current pneumonia season may yield results of value. The study has been carried on under the four following heads:

1. *Laboratory*. — An investigation of improved methods of preparation and concentration of types I and II pneumococcus antibody solution. This work is being conducted under the supervision of the Division of Biologic Laboratories.
2. *Statistical*. — An analysis of death certificates and hospital records, carried on in cooperation with the Division of Adult Hygiene.
3. *Epidemiological*. — A study of the occurrence of pneumococci in the throats of contacts with cases of lobar pneumonia, with special reference to the type of organism found. This phase of the study is being conducted in cooperation with the Harvard School of Public Health.
4. *Serum Therapy*. — A study of the use and therapeutic value of the concentrated serum in the treatment of types I and II lobar pneumonia, especially those cases treated in the home. To this end the serum has been placed in the hands of a group of collaborating physicians selected by an advisory committee. In the areas served by these collaborators, the serum will be available through cooperation between the attending physician and the collaborator. To assist in the work, facilities for prompt sputum typing have been made available in hospitals in the several areas which are at present included in the study. These areas center around Ayer, Beverly, Boston, Brockton, Great Barrington, Newton, Pittsfield and Worcester, and the Chelsea Naval Hospital, serving 56 per cent of the population of the State. It is hoped that in future years as more serum is available, the service may be extended to cover additional areas.

## MILK

Satisfactory progress has been accomplished during the past year in the program for improving the sanitary quality of the milk supply. During the year 21 new communities have legally adopted milk ordinances requiring that all milk be pasteurized or come from tuberculosis-free cattle. This brings the number of communities enjoying this protection to 120, accounting for 80 per cent of the State's population. Eleven of these communities have further protected themselves by providing that all milk shall be pasteurized or certified.

The Department is finding increased interest in the adoption of measures for the protection of the milk supply. Whereas in previous years it has been necessary to arouse interest in the tuberculin test, the situation has now been so reversed that the applications made to the Division of Animal Industry for such testing are far ahead of the local regulations. Over 175 communities in the State have already been accorded the first test or applied for the same on the area plan. It has therefore been possible for the Department to concentrate its efforts on those communities which have so applied, feeling that the farmers whose initiative has prompted them to take such measures for the improvement of their product, should enjoy from their local boards suitable protection against competition from milk of inferior sanitary quality. This program will be actively pushed during the coming year.

Five times during the past year has communicable disease been traced to milk, in all instances raw. Some 20 cases of septic sore throat in Marion and 10 in Wareham were due to the consumption of raw milk from herds in each of which was a cow with a badly infected udder. The first milk-borne outbreak of typhoid since 1928 occurred in Stockbridge and Lee, where 25 cases developed on a milk route supplying but 40 quarts. Investigation showed the wife of the dealer to be a typhoid carrier, who in all probability passed on her infection through contamination of the bottles at the time of washing. In Seekonk, a typhoid carrier caring for a large family infected the greater number, and through sale of the milk from the single family cow passed on the infection to an individual on a neighboring farm. Similarly, a case of typhoid occurred in East Bridgewater, due to infection of a one-cow supply by a milker continuing at work during part of a mild attack of the disease. That more cases did not develop was due solely to the fact that the victim was the only individual to consume this milk raw.

Through the courtesy of the "Rural New Yorker" the Department was permitted to reprint an article describing from a farmer's standpoint the circumstances surrounding an outbreak of septic sore throat spread through raw milk in that State. These reprints have been widely spread through the cooperation of the several agencies having contact with milk producers, and have been accorded a very cordial reception.

## DISTRICT HEALTH UNITS

The past year has seen the actual establishment of the two Union Health Districts which had been planned during 1930 in cooperation with the Commonwealth Fund of New York City.

The first of these districts comprises the sixteen communities of:

Alford	Lee	New Marlborough	Sheffield
Becket	Lenox	Otis	Stockbridge
Egremont	Monterey	Richmond	Tyringham
Great Barrington	Mt. Washington	Sandisfield	West Stockbridge

located in the southern half of Berkshire County. This Southern Berkshire Health Unit began work on February 1, 1931, with Doctor F. S. Leeder, former State District Health Officer, as full-time "Medical Director." In this capacity he serves a population of about 21,500 people, the density of population being forty-nine per square mile.

The second district health unit was started on April 1, 1931, with Doctor G. Fletcher Reeves as "Director of Public Health." This district is located in the northwest corner of Middlesex County and extends over slightly into Worcester County, including within its borders the fourteen towns of:

Ashby	Dunstable	Lunenburg	Townsend
Ayer	Groton	Pepperell	Tyngsborough
Bolton	Harvard	Shirley	
Boxborough	Littleton	Stow	



The population of this district is about that of the Southern Berkshire Area, but the density of population (seventy-six per square mile) is somewhat greater.

Each district health unit is a voluntary grouping of towns for the purpose of demonstrating the advisability of coordinated full-time health service such as could not be obtained by the individual communities working separately. The direction of the policies of each unit has been placed in the hands of a committee representing the several cooperating boards of health. Each unit's director receives his legal status as Health Officer by being appointed the agent of each of the various boards of health. This important step has already been accomplished in all but two of the several communities involved. In this way, a cooperative program embracing all the communities in each district is carried on without any of the local boards of health losing its identity or relinquishing any of its prerogatives.

During the years of demonstration, the Commonwealth Fund is bearing a large part of the financial burden with the expectation that as the work develops the local communities, through the boards of health, school committees, and unofficial health organizations, will take over the support of the project. The State has contributed to the program through partial payment of the salaries of the units' directors who serve as part-time epidemiologists for the Department. The progress thus far made in each area is distinctly auspicious, particularly as concerns the contacts of the new health officers with the local medical profession. The usefulness of a district health unit and the possible advantages that would accrue to other rural communities similarly grouped were well demonstrated during the outbreak of infantile paralysis when, through these health officers, service in the distribution of convalescent serum could be made locally available in a form hardly duplicated in any other section of the State. During the coming winter months, further service of this same type is to be offered in each of the union health districts in connection with the Department's lobar pneumonia study.

Since the organization of these health units, distinct advances have been made in the problem of unification of health ordinances in order to avoid so far as possible the many annoyances resulting from the existence of contradictory regulations in adjoining communities. All of the towns in the Nashoba District have adopted with minor modifications the regulations drawn up by the joint committee of the Department and the Massachusetts Association of Boards of Health. In the Southern Berkshire Area these regulations have been adopted by all but two of the communities.

Each of the union health districts has been built more or less intentionally around a previously existing local community hospital, the Fairview Hospital at Great Barrington in the Southern Berkshire area, and the Ayer Community Memorial Hospital at Ayer in the Nashoba district. At the former, it has been possible to make arrangements for the unit's public health laboratory work to be done by the hospital technician, the hospital being paid therefor by the Unit. In the Nashoba district, however, no laboratory facilities were available at the hospital. Here it was necessary to assist the hospital in setting up a laboratory, which is now rendering both public health and clinical laboratory service.

In addition to the director, the full-time staff of each health unit consists of a supervising nurse, sufficient staff nurses to supplement the work of local nurses already in the area, a milk-sanitary inspector, the services of a laboratory technician, and an office secretary. In some instances, it has been possible to use local personnel in certain positions and all policies for expansion keep this as a prior objective.

The Department cooperates in the district health unit project through a group of four workers (health officer, nurse, inspector and clerk) known as the State Field Unit. This organization was made possible in a large part through the generosity of the Commonwealth Fund, although the State is now contributing substantially towards supporting this group. The work of the State Field Unit during 1931 may be briefly described as having to do with the

1. Arousing of local interest in the district health unit program, and the preliminary organization of two health districts;
2. Assisting in the work done in these districts after the health units are organized, staffed, and equipped; and
3. Serving as a liaison group between the district health units, the State Department of Public Health, and the Commonwealth Fund.



The County Health Unit in Barnstable County has continued during the past year with the cooperation of the United States Public Health Service. This work is distinctly separate from the district health program, but during the coming months it is hoped that through the State Field Unit closer relationship may be established between these two allied projects.

In various sections of the State, interest has been expressed in the establishment of more district health units. This interest is particularly strong in the northern half of Berkshire County and in the northeastern corner of the State, around Newburyport. There has also been some apparent interest in several sections of Plymouth County. The wisdom of actively stimulating such interest may be questioned until such time as it has been demonstrated locally that the present units are so worth while as to be taken over in their entirety by local support. Furthermore, at the present time it would be difficult to obtain outside funds for further demonstration units, without which the establishment of district health units would be more difficult. All efforts for the coming months are to be concentrated on the units already organized.

#### LOCAL HEALTH REGULATIONS

During 1929 and 1930 a joint committee of the Department and the Massachusetts Association of Boards of Health worked on a set of suggested health regulations, keeping in mind particularly the needs of the community of less than 20,000 population. It was not hoped to be able to produce a set of ideal regulations but rather to prepare a working model, which might be used by communities as a basis for the adoption of local regulations, after such alterations and modifications as were necessary to meet local conditions. The report of the committee has been made during the present year, formally approved by the Department and the Association and subsequently printed.<sup>1</sup> The proposed regulations have already served as the basis for those adopted by the Nashoba and Southern Berkshire Health Districts, as well as for several separate communities. Their usefulness will probably be increasingly apparent in the years to come.

#### WAYSIDE STANDS

The wayside stand, overnight camp and tourist home are becoming such important elements in the life of the traveling public that in certain States efforts have been made to regulate them as possible health hazards. In order to determine to what extent these establishments may be a health menace in Massachusetts and what further supervision is desirable over and above that accorded by local boards of health, a survey was made during the past summer. An attempt was made to obtain a representative sample of such establishments in all sections of the State. Examinations were made of 726 places of business, of which 599 were wayside stands, 91 overnight camps and 171 tourist homes.\*

The outstanding impression gained by this survey was the generally satisfactory condition of these places. The traveling public is sufficiently critical and discriminating so that it accords its best patronage to the well-kept stand, and the dirty slovenly-kept establishment is usually passed by and hence goes out of existence. The owner that has the enterprise and initiative so to keep his stand as to attract business is in general the owner who will see beyond mere exterior beauty and provide for a safe water supply and suitable waste disposal. The quality of the milk for sale is very directly dependent upon the local interest shown in the problem of safe milk. Thus, in certain sections the proportion of stands selling pasteurized milk was surprisingly high.

The other side of the picture was found in the occasional stand, that, in spite of a superficial cleanliness, relied upon the use of a water supply which was either polluted or at least open to possible pollution. In most instances the proprietors were active in corrections of the defects when brought to their attention. In other instances, pressure by the local board of health was necessary to remedy conditions. In general, boards of health took an active interest in the problem, though occasionally in the smaller communities a distinct apathy existed toward conditions in stands located in remote sections of the town. Unfortunately, little interest was

\*Some establishments are listed under more than one heading.

found in possible local extension of the supervision to stands not actually disapproved by the Department.

On the basis of the survey it was apparent that the wayside stands and tourist homes, as at present found in Massachusetts, constitute little, if any, health hazard. Compulsory State regulation, while it would unquestionably rectify a few unsatisfactory conditions, would be expensive out of all proportion to the good accomplished. Without question, greater benefit would accrue to the public health through the use of the same amount of money in other directions. What would be accomplished through an expensive licensing system might just as readily be achieved through reliance upon selective inspections by the Department in cooperation with local boards of health.

#### SUMMER CAMPS

Following the intensive survey of summer camps conducted during the previous year, it had been hoped that it would be possible to reinspect those previously visited to determine what had been accomplished and in what way the Department might still further improve certain unsatisfactory conditions. Unfortunately, the planned reinspections could not be completed owing to the outbreak of infantile paralysis, which demanded the full attention of the Department. In those camps that could be reinspected, a gratifying improvement was very evident, not so much in matters of mere improved sanitation, but particularly in the steps taken to guard the physical well-being of the individual. Greater attention was being given to physical examinations of the campers before their arrival, and to the active supervision of their health after arrival. The proportion of camps taking steps to guard against the possible employment of a typhoid carrier in a food handling capacity had likewise increased.

On the basis of the past year's inspections it is increasingly apparent that little would be accomplished through centralized licensing authority. Economic competition is as valuable a stimulus to improved health measures in camps as would be arbitrary regulations, which might be an unnecessary hardship on the conscientious owner, yet be all but evaded by the careless. The principal source of difficulty lies with the camp that prides itself on the fact that its water supply is annually inspected yet does nothing to correct the unsatisfactory conditions that are brought to light each year.

#### DISTRICT HEALTH OFFICERS

During the past year the District Health Officers have carried out efficiently the many duties imposed upon them. In the areas particularly affected by infantile paralysis they were extremely active in arranging for the special serum service made locally available, the collection of blood for convalescent serum, and arrangements for follow-up examination clinics. The usual routine inspections of jails, lock-ups, dispensaries, clinics and communicable disease hospitals were faithfully carried out.

In contrast to previous years, only one community survey was carried out. These have now been abandoned as it is increasingly apparent that they serve little purpose. Where praise has been given it has been appreciated, but criticisms and suggestions have been resented and lead only to strained relations between the Department and the local board without accomplishing improvement in the conditions.

Owing to the establishment of the two union health districts and the appointment of the local health officer as a part-time epidemiologist connected with the Department, it has been possible to make certain changes in the areas covered by the several District Health Officers. These include a rearrangement of the two western districts, with transfer of the Pittsfield office to North Adams, and an enlargement of the Metropolitan District to include twelve more communities, which in the character of their populations are members of the Metropolitan area. It is expected that these changes will decrease the amount of travel required, at the same time adding to the efficiency of the work.

#### BACTERIOLOGICAL LABORATORY

During the past year, 32,605 specimens were examined in the Bacteriological Laboratory, as shown by the accompanying table. This marks a decrease in the

total number in 1930, when 35,575 were examined. The decrease was due to the receipt of less diphtheria and typhoid specimens. It will be noted that more gonorrhea and tuberculosis specimens were examined than during the previous year. Of particular note is the increased number of smears for gonococcus examination, a reflection, perhaps, of an increased interest in the disease.

The increased volume of pneumonia work is due in part to the special study being carried on under a special grant from the Commonwealth Fund. Inasmuch as this work will assume even greater proportions during the next two years, the services of an additional bacteriologist have been engaged at the expense of the grant. This will make possible the necessary expansion of this work without interfering with the laboratory routine.

The usual number of special examinations have been carried on, including specimens of food connected with outbreaks of food poisoning, spinal fluid, urine for tubercle bacilli and blood for undulant fever agglutination test. *Brucella abortus* was isolated from one specimen of blood sent for culture.

## MALARIA PREVENTION

WILSON G. SMILLIE, M.D., *Consulting Epidemiologist*

There is a potential danger of introduction of malaria into the zone adjacent to the Coldbrook-Ware tunnel construction. The two factors necessary for introduction of malaria are: (1) an infected person; (2) *anopheles quadrimaculatus* mosquitoes (the malaria vector in the United States). Tunnel labor is migratory, often coming from places where malaria is prevalent. During a short season of the year, July 1 to September 30, *anopheles quadrimaculatus* mosquitoes are prevalent in Massachusetts. It seemed desirable, therefore, to take all due precautions to prevent any introduction of malaria. If once introduced, it might become endemic or possibly epidemic.

The zone was visited first on July 13. There are only four shafts, with a construction camp at each shaft. The work had just started and construction of the camps was not completed. A survey of mosquito breeding places was made and the camp construction was inspected. No *anopheles* breeding was found.

A second inspection was made August 18. Construction of the camps was complete, but they were not fully occupied. No *anopheles* breeding was found and no adult mosquitoes found in the camps. Screening was excellent.

When visited on September 15, all screens were found securely placed and in good order. At shafts 9 and 12 the dumping operations had filled mosquito breeding places, but at shafts 10 and 11 extensive *anopheles quadrimaculatus* breeding was found. No adult mosquitoes were found in the bunk houses. Most of the labor employed came from local sources and the men lived in the surrounding towns and villages. The bunk houses have been only partially occupied. There have been no cases of fever of obscure origin in the personnel.

A final visit was made to the construction camps on October 6. Due to cold weather, *anopheles quadrimaculatus* breeding had ceased though many larvæ of *A. punctipennis* were found. The screening and general sanitation of the camps was excellent.

A private mess shack had been erected across the road from shaft 11. The water supply was satisfactory, but the toilet facilities were very bad and were promptly reported to the authorities.

## SUMMARY

Extensive *anopheles* breeding has occurred within the vicinity of camps 10 and 11 during late August and September. During September they were preponderately *A. quadrimaculatus*. By October 5, *A. punctipennis* was the prevailing type.

Since there has been almost no immigration from areas where malaria is endemic and since camps have been occupied so little, there has been no danger of any outbreak of malaria.

Next summer, if the work goes on rapidly and the camps are fully occupied with migratory labor, it will be essential to watch them carefully, particularly during August and September.



TABLE I. — *Anterior Poliomyelitis*

YEAR	Cases	Case Rate per 100,000	Deaths	Death Rate per 100,000	Fatality Rate (Per Cent)
1927 . . . . .	1,189	28.4	169	4.0	14.2
1928 . . . . .	434	10.3	65	1.5	15.0
1929 . . . . .	119	2.8	21	.5	17.6
1930 . . . . .	503	11.8	35	.8	7.0
1931 . . . . .	1,428	33.4	114	2.7	8.0

TABLE II. — *Diphtheria*

1927 . . . . .	4,750	113.3	268	6.4	5.6
1928 . . . . .	4,052	96.2	249	5.9	6.1
1929 . . . . .	4,255	100.5	256	6.0	6.0
1930 . . . . .	3,322	78.1	182	4.3	5.5
1931 . . . . .	2,381	55.7	130	3.0	5.4

TABLE III. — *Epidemic Cerebrospinal Meningitis*

1927 . . . . .	75	1.8	43	1.0	57.3
1928 . . . . .	107	2.5	38	.9	35.5
1929 . . . . .	167	3.9	79	1.9	47.3
1930 . . . . .	174	4.1	59	1.4	33.9
1931 . . . . .	101	2.4	30	.7	29.7

TABLE IV. — *Lobar Pneumonia*

1927 . . . . .	4,279	102.1	1,969	47.0	46.0
1928 . . . . .	4,785	113.6	2,163	51.3	45.2
1929 . . . . .	5,287	124.9	2,202	52.0	41.6
1930 . . . . .	4,333	101.8	1,883	44.3	43.5
1931 . . . . .	3,873	90.6	1,718	40.2	44.4

TABLE V. — *Measles*

1927 . . . . .	13,498	322.0	87	2.1	.6
1928 . . . . .	41,519	985.5	265	6.3	.6
1929 . . . . .	14,925	352.5	121	2.9	.8
1930 . . . . .	27,137	637.8	137	3.2	.5
1931 . . . . .	16,581	387.8	64	1.5	.4

TABLE VI. — *Scarlet Fever*

1927 . . . . .	16,546	394.7	144	3.4	.9
1928 . . . . .	10,473	248.6	90	2.1	.9
1929 . . . . .	9,975	235.6	71	1.7	.7
1930 . . . . .	9,408	221.1	98	2.3	1.0
1931 . . . . .	12,782	298.9	101	2.4	.8

TABLE VII. — *Smallpox*

1927 . . . . .	2	—	—	—	—
1928 . . . . .	19	—	—	—	—
1929 . . . . .	273	—	1	—	—
1930 . . . . .	2	—	—	—	—
1931 . . . . .	6	—	—	—	—

TABLE VIII. — *Tuberculosis, Pulmonary*

1927 . . . . .	5,049	120.5	2,774	66.2	54.9
1928 . . . . .	4,873	115.7	2,690	63.9	55.2
1929 . . . . .	4,538	107.2	2,561	60.5	56.4
1930 . . . . .	4,696	110.4	2,423	56.9	51.6
1931 . . . . .	4,421	103.4	2,306	53.9	52.2

TABLE IX. — *Tuberculosis, Non-Pulmonary*

YEAR	Cases	Case Rate per 100,000	Deaths	Death Rate per 100,000	Fatality Rate (Per Cent)
1927 . . . . .	807	19.3	429	10.2	53.2
1928 . . . . .	757	18.0	433	10.3	57.2
1929 . . . . .	649	15.3	361	8.5	55.6
1930 . . . . .	587	13.8	311	7.3	53.0
1931 . . . . .	555	13.0	248	5.8	44.7

TABLE X. — *Typhoid Fever*

1927 . . . . .	466	11.1	44	1.00	9.4
1928 . . . . .	310	7.4	36	.85	11.6
1929 . . . . .	307	7.3	42	.99	13.7
1930 . . . . .	318	7.5	38	.89	11.9
1931 . . . . .	250	5.8	30	.70	12.0

TABLE XI. — *Whooping Cough*

1927 . . . . .	6,273	149.7	149	3.6	2.4
1928 . . . . .	8,023	190.4	208	4.9	2.6
1929 . . . . .	7,708	182.1	137	3.2	1.8
1930 . . . . .	10,750	252.6	182	4.3	1.7
1931 . . . . .	7,174	167.8	88	2.1	1.2

TABLE XII. — *Gonorrhea and Syphilis*

YEAR	GONORRHEA		SYPHILIS				
	Cases	Case Rate per 100,000	Cases	Case Rate per 100,000	Deaths	Death Rate per 100,000	Fatality Rate (Per Cent)
1927 . . . . .	4,294	102.4	1,666	39.7	135	3.2	8.1
1928 . . . . .	4,506	107.0	1,569	37.2	164	3.9	10.5
1929 . . . . .	4,410	104.2	1,531	36.2	133	3.1	8.7
*1930 . . . . .	6,974	163.9	4,197	98.6	149	3.5	3.6
1931 . . . . .	7,201	168.4	4,447	104.0	168	3.9	3.8

\*All forms made reportable to State Department of Public Health.

TABLE XIII. — *General Paralysis of the Insane*

YEAR	DEATHS		FIRST ADMISSIONS TO STATE INSTITUTIONS FOR MENTAL DISEASES		
	Deaths	Death Rate per 100,000	First Admissions	Rate per 100,000	Per Cent of All First Admissions
1927 . . . . .	198	4.6	190	4.5	6.7
1928 . . . . .	204	4.7	202	4.7	6.4
1929 . . . . .	186	4.2	226	5.2	7.4
1930 . . . . .	168	3.9	227	5.3	7.2
1931 . . . . .	166	3.9	203	4.8	6.4

TABLE XIV. — *Gonorrhea and Syphilis Treated in Clinics and Institutions.  
Subsidized Clinics*

YEAR	NEW CASES		Visits	Number of Clinics
	Gonorrhea	Syphilis		
1927 . . . . .	2,351	3,307	160,444	15
1928 . . . . .	2,286	2,274	174,714	15
1929 . . . . .	2,238	2,163	172,777	15
1930 . . . . .	2,498	2,462	190,535	14
1931 . . . . .	2,742	2,207	183,638	14

*Non-Subsidizing Clinics*

1928 . . . . .	177	378	18,147	9
1929 . . . . .	214	446	21,485	10
1930 . . . . .	249	506	26,917	11
1931 . . . . .	298	424	22,795	11

*Institutions*

1928 . . . . .	338	635	—	27
1929 . . . . .	344	660	—	27
1930 . . . . .	356	723	—	25
1931 . . . . .	436	823	—	24

TABLE XV. — *Grams of Arsphenamine, Sulpharsphenamine and Neoarsphenamine Distributed.*

YEAR	Arsphen- amine	Sulph- arsphenamine	Neo- arsphenamine	Total	Accumulative Total
1927 . . . . .	14,010	17,230	—	31,240	226,454
1928 . . . . .	8,312	16,619	13,134	38,066	264,520
1929 . . . . .	8,753	17,634	18,146	44,533	309,053
1930 . . . . .	9,802	12,915	22,284	45,001	354,054
1931 . . . . .	9,235	13,676	26,987	49,898	403,952

TABLE XVI. — *Grams of Arsphenamine, Sulpharsphenamine and Neoarsphenamine Distributed to Subsidized Clinics, Other Institutions and Physicians Clinics*

1927 . . . . .	13,075	9,812	—	22,887
1928 . . . . .	6,972	8,537	8,648	24,157
1929 . . . . .	7,328	7,481	9,615	24,624
1930 . . . . .	7,963	3,744	12,164	23,870
1931 . . . . .	7,160	4,559	14,692	26,411

*Institutions*

1927 . . . . .	922	6,903	—	7,825
1928 . . . . .	1,187	6,966	3,137	11,290
1929 . . . . .	1,101	7,317	3,851	12,269
1930 . . . . .	1,711	6,509	4,013	12,233
1931 . . . . .	1,919	6,362	6,022	14,303

*Physicians*

1927 . . . . .	13.2	515	—	528
1928 . . . . .	153.4	1,116	1,350	2,619
1929 . . . . .	123.4	2,836	4,681	7,640
1930 . . . . .	128.0	2,662	6,107	8,898
1931 . . . . .	156.4	2,754	6,272	9,183

TABLE XVII. — *Total Laboratory Examinations — 1931 AND 1930*

	1931	1930
Diphtheria . . . . .	12,447	16,360
Tuberculosis . . . . .	4,408	4,010
Typhoid Fever:		
Widal . . . . .	1,790	2,019
Culture . . . . .	2,346	3,071
Malaria . . . . .	50	58
Gonorrhea . . . . .	8,510	7,321
Pneumonia . . . . .	568	468
Undulant Fever . . . . .	401	280
Miscellaneous . . . . .	2,085	1,979
Total . . . . .	32,605	35,575



TABLE XVIII. — *Laboratory Examinations — 1931*

	Positive	Negative	Total
Diphtheria:			
Diagnosis . . . . .	616	8,532	9,148
Release . . . . .	1,196	2,103	3,299
Tuberculosis:			
Sputum . . . . .	817	3,591	4,408
Animal inoculations . . . . .	15	125	140
Typhoid Fever:			
Widal test . . . . .	182	1,555	*1,790
Examination for typhoid bacilli:			
Blood . . . . .	2	74	76
Feces . . . . .	81	1,418	1,499
Urine . . . . .	3	757	760
Bile . . . . .	1	10	11
Gonorrhea . . . . .	1,613	6,897	8,510
Malaria . . . . .	0	50	50
Miscellaneous:			
Pneumococcus type determinations . . . . .	—	—	568
Hemolytic streptococci . . . . .	—	—	1,362
Spinal fluid for meningococci . . . . .	—	—	16
Undulant fever . . . . .	33	368	401
Unclassified . . . . .	—	—	567
Total . . . . .			32,605

\*Includes 53 atypical.

TABLE XIX. — *Laboratory Examinations for Rabies\*\**

YEARS	Positive Dogs	Other Animals	Negative	Total Animals Examined
1927 . . . . .	335	18	157	510
1928 . . . . .	334	26	186	546
1929 . . . . .	316	5	134	455
1930 . . . . .	292	18	161	471
1931 . . . . .	290	14	211	515

\*\*Wassermann Laboratory

*Cases and Deaths, with Case and Death Rates per 100,000 Population\* for Reportable Diseases During the Year 1931.*

DISEASES	Cases	Case Rate per 100,000 Population	Deaths	Death Rate per 100,000 Population	Fatality Rate (Per Cent)
Actinomycosis . . . . .	5	.1	1	.02	20.0
Anterior Poliomyelitis . . . . .	1,428	33.4	114	2.7	8.0
Anthrax . . . . .	15	.4	1	.02	6.7
Chicken Pox . . . . .	9,613	224.8	4	.1	.04
Diphtheria . . . . .	2,381	55.7	130	3.0	5.4
Dog Bite . . . . .	6,878	160.9	—	—	—
Dysentery . . . . .	26	.6	5	.1	19.2
Encephalitis Lethargica . . . . .	34	.8	24	.6	70.6
Ep. Cerebrospinal Meningitis . . . . .	101	2.4	30	.7	29.7
German Measles . . . . .	2,736	64.0	—	—	—
Gonorrhea . . . . .	7,201	168.4	5	.1	.06
Hookworm . . . . .	1	.02	—	—	—
Influenza . . . . .	1,235	28.9	432	10.1	35.0
Leprosy . . . . .	1	.02	—	—	—
Malaria . . . . .	18	.4	2	.04	11.1
Measles . . . . .	16,581	387.8	64	1.5	.4
Mumps . . . . .	5,904	138.1	8	.2	.1
Ophthalmia Neonatorum . . . . .	1,249	29.2	—	—	—
Paratyphoid . . . . .	6	.1	1	.02	16.7
Pellagra . . . . .	25	.6	16	.4	64.0
Pneumonia, Lobar . . . . .	3,873	90.6	1,718	40.2	44.4
Rabies . . . . .	4	.1	4	.1	100.0
Scarlet Fever . . . . .	12,782	298.9	101	2.4	.8
Septic Sore Throat . . . . .	226	5.3	46	1.1	20.4
Smallpox . . . . .	6	.1	—	—	—
Syphilis . . . . .	4,447	104.0	168	3.9	3.8
Tetanus . . . . .	24	.6	21	.5	87.5
Trachoma . . . . .	40	.9	—	—	—
Trichinosis . . . . .	14	.3	—	—	—
Tuberculosis, Pulmonary . . . . .	4,421	103.4	2,306	53.9	52.2
Tuberculosis, Other Forms . . . . .	555	13.0	248	5.8	44.7
Tuberculosis, Hilum . . . . .	684	16.0	—	—	—
Typhoid Fever . . . . .	250	5.8	30	.7	12.0
Typhus Fever . . . . .	1	.02	—	—	—
Undulant Fever . . . . .	15	.4	—	—	—
Whooping Cough . . . . .	7,174	167.8	88	2.1	1.2
<b>Total . . . . .</b>	<b>89,954</b>	<b>2,103.7</b>	<b>5,567</b>	<b>130.2</b>	<b>6.2</b>

\*Population 4,275,966.

## Cases and Deaths for all Reportable Diseases by Months—1931

	JAN.		FEB.		MARCH		APRIL		MAY		JUNE		JULY		AUGUST		SEPTEMBER		OCTOBER		NOVEMBER		DECEMBER		TOTAL	
	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths		
Actinomycosis	9	3	4	1	3	1	5	2	3	1	15	2	59	6	433	38	588	37	234	22	56	1	19	1	1428	114
Anterior Poliomyelitis																										
Anthrax	1896		1295		1050		1006		1138		1076		370		2		63		208		487		912		9613	15
Chicken Pox	330	15	201	10	199	6	180	14	148	12	189	10	165	12	5	5	144	6	194	9	240	16	15	15	2381	130
Diphtheria	318		271		385		551		750		877		967		808		651		513		427		360		6878	5
Dog Bite															3	1	7		1		5		5		26	5
Dysentery	2	1	1	1	6	7	2	3	2						4	1	5	3	1	1	3	2	1		34	24
Encephalitis Lethargica	9	3	1																							
Epidemic Cerebrospinal Meningitis	10	3	12	3	8	2	8	1	8	6	7	1	6	1	7	3	7	2	8	1	12	6	8	1	101	30
German Measles	143		226		482		630		602		352		71		39		30		36		66		59		2736	5
Gonorrhea	632	1	483		550	1	528	1	607	1	662		632	1	679		622		662		559		585	1	7201	5
Hookworm																										
Influenza	458	64	534	164	65	80	31	32	23	25	3	4	9	7	8	9	22	7	32	10	19	15	31	15	1235	432
Leprosy																										
Malaria																										
Measles	2483	14	2196	8	2026	8	2201	6	2299	8	2360	9	964	4	179	4	80	1	173	1	390	1			16581	64
Mumps	453		525		683		767		644		592		270		185		121	2	292		627		745		5904	8
Neonatorum	152		75		143		45		122		119		108		126		101		82		96		80		1249	1
Ophthalmia Neonatorum																										
Paratyphoid																										
Pellagra																										
Pneumonia, Lobar	640	285	753	322	408	197	483	207	335	125	199	91	92	57	73	38	104	45	190	83	241	107	355	161	3873	1718
Rabies																										
Scarlet Fever	1409	12	1510	8	1636	11	1584	17	1542	11	897	6	482	5	290	6	355	3	678	1	903	7	1496	14	12782	101
Septic Sore Throat	26	4	11	4	26	5	19	5	15	1	8	5	14	4	25	2	16	5	17	3	21	4	28	4	228	46
Smallpox	335	16	318	8	420	13	372	12	361	15	393	20	337	16	398	12	341	10	355	19	326	14	491	13	4447	168
Syphilis																										
Tetanus	1																									
Trachoma	4		4		2		4		3		3		6	7	3	1	2		9	5	5	2	1		24	21
Trichinosis																										
Tuberculosis, Pulmonary	382	184	395	1	451	241	346	196	380	240	425	194	429	196	392	179	320	160	332	148	349	191	310	177	4421	2396
Tuberculosis, Other Forms	48	18	33	22	54	11	40	17	54	28	64	25	55	25	37	17	54	23	33	23	47	20	36	19	555	248
Tuberculosis, Hilum	89		26		51		27		37		35		165		37		109		29		40		19		684	
Typhoid Fever	14	2	12		8	1	9	1	18		18	6	34	4	33	3	25	4	34	4	14	3	31	2	250	30
Typhus Fever																										
Undulant Fever																										
Whooping Cough	806	8	583	11	877	11	631	7	625	5	505	10	520	6	557	9	546	8	323	5	474	3	727	5	7174	88
Total	10657	633	9475	763	9539	594	9475	527	9725	485	8811	390	5771	356	4498	331	4329	319	4448	341	5423	394	7803	434	89954	5567



*Index to Line Numbers in the Table of Cases and Deaths from Diseases Dangerous  
to the Public Health, 1931*

Abington . . . . .	113	East Bridgewater . . . . .	147	Ludlow . . . . .	81
Acton . . . . .	180	East Brookfield . . . . .	281	Lunenburg . . . . .	207
Acushnet . . . . .	137	East Longmeadow . . . . .	152	Lynn . . . . .	9
Adams . . . . .	64	Eastham . . . . .	312	Lynnfield . . . . .	225
Agawam . . . . .	93	Easthampton . . . . .	69		
Alford . . . . .	345	Easton . . . . .	123	Malden . . . . .	16
Amesbury . . . . .	66	Edgartown . . . . .	254	Manchester . . . . .	177
Amherst . . . . .	114	Egremont . . . . .	306	Mansfield . . . . .	109
Andover . . . . .	76	Enfield . . . . .	314	Marblehead . . . . .	82
Arlington . . . . .	27	Erving . . . . .	255	Marion . . . . .	218
Ashburnham . . . . .	200	Essex . . . . .	243	Marlborough . . . . .	53
Ashby . . . . .	275	Everett . . . . .	19	Marshfield . . . . .	231
Ashfield . . . . .	286			Mashpee . . . . .	322
Ashland . . . . .	188	Fairhaven . . . . .	70	Mattapoisett . . . . .	240
Athol . . . . .	71	Fall River . . . . .	6	Maynard . . . . .	101
Attleboro . . . . .	37	Falmouth . . . . .	126	Medfield . . . . .	134
Auburn . . . . .	106	Fitchburg . . . . .	26	Medford . . . . .	15
Avon . . . . .	184	Florida . . . . .	335	Medway . . . . .	158
Ayer . . . . .	162	Foxborough . . . . .	121	Melrose . . . . .	34
		Frammingham . . . . .	36	Mendon . . . . .	269
Barnstable . . . . .	88	Franklin . . . . .	100	Merrimac . . . . .	186
Barre . . . . .	148	Freetown . . . . .	227	Methuen . . . . .	42
Becket . . . . .	301			Middleborough . . . . .	85
Bedford . . . . .	168	Gardner . . . . .	45	Middlefield . . . . .	346
Belchertown . . . . .	157	Gay Head . . . . .	348	Middleton . . . . .	220
Bellingham . . . . .	154	Georgetown . . . . .	214	Milford . . . . .	57
Belmont . . . . .	35	Gill . . . . .	276	Millbury . . . . .	96
Berkley . . . . .	270	Gloucester . . . . .	33	Millis . . . . .	219
Berlin . . . . .	273	Goshen . . . . .	340	Millville . . . . .	202
Bernardston . . . . .	283	Gosnold . . . . .	352	Milton . . . . .	46
Beverly . . . . .	31	Grafton . . . . .	98	Monroe . . . . .	342
Billerica . . . . .	112	Granby . . . . .	282	Monson . . . . .	125
Blackstone . . . . .	128	Granville . . . . .	297	Montague . . . . .	87
Blandford . . . . .	304	Great Barrington . . . . .	115	Monterey . . . . .	330
Bolton . . . . .	291	Greenfield . . . . .	51	Montgomery . . . . .	351
Boston . . . . .	2	Greenwich . . . . .	347	Mount Washington . . . . .	355
Bourne . . . . .	169	Groton . . . . .	182		
Boxborough . . . . .	332	Groveland . . . . .	190	Nahant . . . . .	224
Boxford . . . . .	299			Nantucket . . . . .	143
Boylston . . . . .	267	Hadley . . . . .	178	Natick . . . . .	59
Braintree . . . . .	50	Halifax . . . . .	292	Needham . . . . .	68
Brewster . . . . .	290	Hamilton . . . . .	201	New Ashford . . . . .	354
Bridgewater . . . . .	80	Hampden . . . . .	295	New Bedford . . . . .	7
Brimfield . . . . .	284	Hancock . . . . .	329	New Braintree . . . . .	316
Brookton . . . . .	14	Hanover . . . . .	171	New Marlborough . . . . .	287
Brookfield . . . . .	251	Hanson . . . . .	194	New Salem . . . . .	317
Brookline . . . . .	20	Hardwick . . . . .	189	Newbury . . . . .	233
Buckland . . . . .	241	Harvard . . . . .	278	Newburyport . . . . .	56
Burlington . . . . .	215	Harwich . . . . .	187	Newton . . . . .	13
		Hatfield . . . . .	185	Norfolk . . . . .	242
Cambridge . . . . .	5	Haverhill . . . . .	21	North Adams . . . . .	41
Canton . . . . .	116	Hawley . . . . .	333	North Andover . . . . .	102
Carlisle . . . . .	302	Heath . . . . .	328	North Attleborough . . . . .	74
Carver . . . . .	248	Hingham . . . . .	104	North Brookfield . . . . .	163
Charlemont . . . . .	289	Hinsdale . . . . .	262	North Reading . . . . .	204
Charlton . . . . .	199	Holbrook . . . . .	153	Northampton . . . . .	32
Chatham . . . . .	205	Holden . . . . .	139	Northborough . . . . .	206
Chelmsford . . . . .	95	Holland . . . . .	349	Northbridge . . . . .	78
Chelsea . . . . .	22	Holliston . . . . .	167	Northfield . . . . .	209
Cheshire . . . . .	223	Holyoke . . . . .	17	Norton . . . . .	172
Chester . . . . .	245	Hopedale . . . . .	166	Norwell . . . . .	236
Chesterfield . . . . .	315	Hopkinton . . . . .	179	Norwood . . . . .	54
Chicopee . . . . .	23	Hubbardston . . . . .	277		
Chilmark . . . . .	339	Hudson . . . . .	84	Oak Bluffs . . . . .	252
Clarksburg . . . . .	253	Hull . . . . .	210	Oakham . . . . .	309
Clinton . . . . .	65	Huntington . . . . .	263	Orange . . . . .	122
Cohasset . . . . .	160			Orleans . . . . .	258
Colrain . . . . .	249	Ipswich . . . . .	120	Otis . . . . .	324
Concord . . . . .	90			Oxford . . . . .	140
Conway . . . . .	285	Kingston . . . . .	173		
Cummington . . . . .	305			Palmer . . . . .	79
		Lakeville . . . . .	228	Paxton . . . . .	296
Dalton . . . . .	131	Lancaster . . . . .	165	Peabody . . . . .	40
Dana . . . . .	311	Lanesborough . . . . .	261	Pelham . . . . .	313
Danvers . . . . .	60	Lawrence . . . . .	11	Pembroke . . . . .	239
Dartmouth . . . . .	83	Lee . . . . .	138	Pepperell . . . . .	164
Dedham . . . . .	52	Leicester . . . . .	129	Peru . . . . .	353
Deerfield . . . . .	170	Lenox . . . . .	174	Petersham . . . . .	300
Dennis . . . . .	213	Leominster . . . . .	39	Phillipston . . . . .	325
Dighton . . . . .	159	Leverett . . . . .	298	Pittsfield . . . . .	18
Douglas . . . . .	196	Lexington . . . . .	77	Plainfield . . . . .	331
Dover . . . . .	257	Leyden . . . . .	337	Plainville . . . . .	230
Dracut . . . . .	99	Lincoln . . . . .	235	Plymouth . . . . .	61
Dudley . . . . .	132	Littleton . . . . .	244	Plympton . . . . .	308
Dunstable . . . . .	319	Longmeadow . . . . .	127	Princeton . . . . .	294
Duxbury . . . . .	222	Lowell . . . . .	10	Provincetown . . . . .	142

Quincy . . . . .	12	Spencer . . . . .	110	Webster . . . . .	63
Randolph . . . . .	105	Springfield . . . . .	4	Wellesley . . . . .	67
Raynham . . . . .	198	Sterling . . . . .	238	Wellfleet . . . . .	288
Reading . . . . .	75	Stockbridge . . . . .	217	Wendell . . . . .	326
Rehoboth . . . . .	176	Stoneham . . . . .	73	Wenham . . . . .	259
Revere . . . . .	30	Stoughton . . . . .	86	West Boylston . . . . .	195
Richmond . . . . .	303	Stow . . . . .	265	West Bridgewater . . . . .	155
Rochester . . . . .	264	Sturbridge . . . . .	216	West Brookfield . . . . .	256
Rockland . . . . .	92	Sudbury . . . . .	266	West Newbury . . . . .	229
Rockport . . . . .	149	Sunderland . . . . .	268	West Springfield . . . . .	48
Rowe . . . . .	334	Sutton . . . . .	197	West Stockbridge . . . . .	272
Rowley . . . . .	250	Swampscott . . . . .	72	West Tisbury . . . . .	338
Royalston . . . . .	293	Swansea . . . . .	135	Westborough . . . . .	107
Russell . . . . .	260	Taunton . . . . .	29	Westfield . . . . .	43
Rutland . . . . .	181	Templeton . . . . .	136	Westford . . . . .	146
Salem . . . . .	24	Tewksbury . . . . .	117	Westhampton . . . . .	321
Salisbury . . . . .	191	Tisbury . . . . .	232	Westminster . . . . .	208
Sandisfield . . . . .	318	Tolland . . . . .	350	Weston . . . . .	150
Sandwich . . . . .	246	Topsfield . . . . .	274	Westport . . . . .	130
Saugus . . . . .	55	Townsend . . . . .	221	Westwood . . . . .	192
Savoy . . . . .	336	Truro . . . . .	307	Weymouth . . . . .	38
Scituate . . . . .	156	Tyngsborough . . . . .	247	Whately . . . . .	271
Seekonk . . . . .	124	Tyringham . . . . .	341	Whitman . . . . .	89
Sharon . . . . .	151	Upton . . . . .	203	Wilbraham . . . . .	175
Sheffield . . . . .	226	Uxbridge . . . . .	108	Williamsburg . . . . .	211
Shelburne . . . . .	234	Wakefield . . . . .	49	Williamstown . . . . .	141
Sherborn . . . . .	279	Wales . . . . .	327	Wilmington . . . . .	133
Shirley . . . . .	183	Walpole . . . . .	91	Winchendon . . . . .	111
Shrewsbury . . . . .	94	Waltham . . . . .	25	Wihncester . . . . .	62
Shutesbury . . . . .	343	Ware . . . . .	97	Windsor . . . . .	320
Somerset . . . . .	119	Wareham . . . . .	118	Winthrop . . . . .	47
Somerville . . . . .	8	Warren . . . . .	144	Woburn . . . . .	44
South Hadley . . . . .	103	Warwick . . . . .	323	Worcester . . . . .	3
Southampton . . . . .	280	Washington . . . . .	344	Worthington . . . . .	310
Southborough . . . . .	193	Watertown . . . . .	28	Wrentham . . . . .	145
Southbridge . . . . .	58	Wayland . . . . .	161	Yarmouth . . . . .	212
Southwick . . . . .	237			Tewksbury State Infirmary	356





## Cases and Deaths from Diseases Dangerous

Line No.	CITIES AND TOWNS IN ORDER OF POPULATION	Population estimated as of July 1, 1931	An- terior Polio- mye- litis		Chicken Pox		Diph- theria		Ep. Cere- bro- spinal Menin- gitis		Ger- man Meas- les		Gonor- rhea	
			Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths
1	Massachusetts . . . . .	4,275,966	1428	114	9613	4	2381	130	101	30	2736	-	7201	5
2	CITIES OF OVER 500,000 . . . . .													
3	Boston . . . . .	781,579	211	55	2303	1	701	38	32	16	231	-	2669	3
4	CITIES OF OVER 150,000 . . . . .	348,304	181	15	688	-	166	12	7	2	487	-	644	-
5	Worcester . . . . .	196,448	38	7	451	-	117	8	4	1	433	-	304	-
6	Springfield . . . . .	151,856	93	8	237	-	39	4	3	1	54	-	340	-
7	CITIES OF 100,000-150,000 . . . . .	542,129	96	6	1208	1	496	30	13	3	347	-	898	-
8	Cambridge . . . . .	112,138	21	1	574	-	53	1	4	-	48	-	248	-
9	Fall River . . . . .	111,854	25	2	123	1	100	8	3	3	16	-	112	-
10	New Bedford . . . . .	110,882	29	3	165	-	118	10	2	-	15	-	219	-
11	Somerville . . . . .	105,124	12	-	102	-	119	7	2	-	18	-	170	-
12	Lynn . . . . .	102,131	8	-	244	-	106	4	2	-	250	-	149	-
13	CITIES OF 50,000-100,000 . . . . .	615,701	205	15	854	-	229	16	19	5	587	-	829	1
14	Lowell . . . . .	97,733	15	3	36	-	26	6	3	-	1	-	202	-
15	Lawrence . . . . .	82,970	3	-	19	-	13	2	4	1	1	-	132	1
16	Quincy . . . . .	74,964	23	1	70	-	10	-	1	-	7	-	67	-
17	Newton . . . . .	68,335	26	-	252	-	1	-	-	-	28	-	59	-
18	Brockton . . . . .	63,412	26	1	163	-	48	1	-	-	433	-	70	-
19	Medford . . . . .	62,729	15	-	157	-	64	2	6	-	13	-	92	-
20	Malden . . . . .	59,596	15	1	119	-	62	5	2	-	97	-	86	-
21	Holyoke . . . . .	55,588	61	8	16	-	3	-	3	4	5	-	63	-
22	Pittsfield . . . . .	50,374	21	1	22	-	2	-	-	-	2	-	58	-
23	CITIES AND TOWNS OF 25,000-50,000 . . . . .	535,990	184	7	969	1	368	16	12	-	115	-	779	1
24	Everett . . . . .	49,998	14	1	40	-	103	2	2	-	8	-	96	-
25	Brookline . . . . .	48,691	10	-	121	-	9	-	1	-	30	-	65	-
26	Haverhill . . . . .	48,580	16	-	74	-	6	2	1	-	8	-	99	-
27	Chelsea . . . . .	45,460	6	-	20	-	42	2	3	-	7	-	97	-
28	Chicopee . . . . .	44,441	28	-	19	-	20	1	1	-	1	-	56	-
29	Salem . . . . .	43,485	10	2	62	-	60	4	1	-	-	-	60	-
30	Waltham . . . . .	40,371	28	-	32	-	4	-	1	-	6	-	41	-
31	Fitchburg . . . . .	39,964	31	1	20	1	10	-	1	-	1	-	47	-
32	Arlington . . . . .	38,879	10	-	297	-	8	-	-	-	18	-	30	-
33	Watertown . . . . .	37,270	14	-	158	-	23	-	1	-	12	-	50	-
34	Taunton . . . . .	36,881	-	-	6	-	38	3	-	-	2	-	16	-
35	Revere . . . . .	36,284	9	-	56	-	38	1	-	-	17	-	74	-
36	Beverly . . . . .	25,686	8	3	54	-	7	1	-	-	5	-	48	1
37	CITIES AND TOWNS OF 10,000-25,000 . . . . .	713,141	306	10	1974	1	233	5	10	3	293	-	753	-
38	Northampton . . . . .	24,439	42	2	114	-	4	-	1	1	13	-	32	-
39	Gloucester . . . . .	24,411	2	-	17	-	3	-	2	1	1	-	39	-
40	Melrose . . . . .	23,920	5	-	19	-	8	-	-	-	4	-	33	-
41	Belmont . . . . .	23,368	4	-	181	-	11	-	-	-	18	-	26	-
42	Framingham . . . . .	22,490	4	-	169	-	-	-	-	-	5	-	13	-
43	Attleboro . . . . .	22,054	6	-	26	-	7	-	-	-	39	-	12	-
44	Weymouth . . . . .	21,787	11	-	15	-	8	1	-	-	-	-	22	-
45	Leominster . . . . .	21,734	31	-	30	-	-	-	-	-	3	-	17	-
46	Peabody . . . . .	21,712	3	-	77	-	57	-	-	-	2	-	20	-
47	North Adams . . . . .	21,351	6	-	3	-	1	-	-	-	-	-	9	-
48	Methuen . . . . .	21,184	6	-	49	-	2	-	-	-	2	-	13	-
49	Westfield . . . . .	19,882	6	-	20	-	2	-	-	-	2	-	15	-
50	Woburn . . . . .	19,698	-	-	14	-	9	-	-	-	7	-	23	-
51	Gardner . . . . .	19,565	13	1	122	1	1	-	-	-	1	-	38	-
52	Milton . . . . .	17,326	6	-	64	-	3	-	-	-	20	-	15	-
53	Winthrop . . . . .	17,024	7	-	94	-	4	-	-	-	4	-	22	-
54	West Springfield . . . . .	17,022	3	1	3	-	-	-	-	-	-	-	23	-
55	Wakefield . . . . .	16,493	1	-	7	-	2	-	1	-	-	-	16	-
56	Braintree . . . . .	16,340	10	-	55	-	4	-	-	-	17	-	11	-
57	Greenfield . . . . .	15,562	38	6	83	-	4	1	3	1	7	-	20	-
58	Dedham . . . . .	15,440	2	-	10	-	1	-	-	-	2	-	9	-
59	Marlboro . . . . .	15,426	5	-	67	-	4	-	-	-	-	-	32	-
60	Norwood . . . . .	15,272	4	-	27	-	2	-	-	-	26	-	7	-
61	Saugus . . . . .	15,188	3	-	21	-	6	-	1	-	7	-	15	-
62	Newburyport . . . . .	14,952	1	-	60	-	13	-	-	-	1	-	21	-
63	Milford . . . . .	14,732	1	-	10	-	1	1	-	-	8	-	12	-
64	Southbridge . . . . .	13,959	-	-	1	-	-	-	-	-	-	-	13	-
65	Natick . . . . .	13,767	2	-	46	-	2	-	-	-	7	-	18	-
66	Danvers . . . . .	13,246	6	-	15	-	4	-	-	-	1	-	9	-
67	Plymouth . . . . .	13,010	2	-	55	-	9	-	-	-	3	-	18	-
68	Winchester . . . . .	13,006	6	-	104	-	18	-	-	-	9	-	13	-
69	Webster . . . . .	12,893	5	-	5	-	-	-	1	-	-	-	9	-
70	Adams . . . . .	12,491	2	-	4	-	11	1	-	-	-	-	2	-
71	Clinton . . . . .	12,477	3	-	18	-	1	-	-	-	-	-	7	-
72	Amesbury . . . . .	12,065	13	-	83	-	11	-	-	-	1	-	23	-
73	Wellesley . . . . .	12,035	5	-	148	-	-	-	-	-	28	-	9	-
74	Needham . . . . .	11,309	1	-	80	-	1	-	-	-	26	-	11	-

to the Public Health, 1931

Influenza	Lobar Pneumonia		Measles	Mumps	Ophthalmia Neonatorum		Scarlet Fever	Syphilis	Tuberculosis, Pulmonary	Tuberculosis, Other Forms	Typhoid Fever	Whooping Cough	Line No.									
Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths									
1235	432	3878	1718	16581	64	5904	8	1249	-	12782	101	4447	168	4421	2306	555	248	250	30	7174	88	1
575	54	1192	454	2410	16	461	2	657	-	3258	32	1834	74	1382	500	210	70	39	9	1401	21	2
79	39	429	165	429	-	1465	-	105	-	1381	14	416	13	348	163	39	20	12	5	708	2	3
68	17	261	101	132	-	968	-	67	-	1031	12	195	10	230	106	22	9	5	1	529	2	4
11	22	168	64	297	-	497	-	38	-	350	2	221	3	118	57	17	11	7	4	179	2	4
172	64	647	216	2926	13	771	2	140	-	1767	14	600	18	611	261	89	32	40	2	1080	20	5
101	8	229	54	419	1	262	-	23	-	505	1	177	5	156	69	25	4	6	-	321	4	5
21	9	111	46	280	2	210	-	59	-	418	6	63	3	132	80	12	8	12	-	113	4	6
6	16	89	34	742	7	90	1	50	-	159	2	169	7	142	74	21	13	17	2	250	7	7
21	11	130	43	218	3	46	1	2	-	458	4	103	-	89	23	14	4	4	-	127	3	8
23	10	88	39	1267	-	163	-	227	1	88	3	92	15	17	3	17	3	35	4	269	2	9
100	61	381	177	2892	13	659	1	230	-	1700	7	468	10	625	198	86	37	35	-	948	15	10
18	8	36	21	729	8	52	1	3	-	256	1	67	2	115	49	10	4	9	1	24	1	11
6	9	35	25	611	2	20	-	122	-	55	-	96	2	57	12	11	3	6	1	31	4	10
23	5	36	26	214	-	57	-	1	-	311	-	48	-	81	24	18	4	4	-	96	4	13
11	9	31	14	158	-	219	-	1	-	207	1	30	-	34	9	5	5	4	-	325	2	13
1	5	45	24	288	1	27	-	92	-	181	-	46	-	45	15	12	4	1	-	184	1	14
26	4	77	19	252	-	50	-	6	-	372	2	43	2	55	11	9	2	3	-	142	1	15
7	4	39	12	503	2	17	-	2	-	224	2	50	1	63	16	12	2	2	-	118	-	16
4	9	55	15	128	-	30	-	3	-	43	1	47	3	50	46	6	10	-	-	20	-	17
4	8	27	21	9	-	87	-	-	-	51	-	41	-	25	16	3	3	6	2	8	2	18
126	44	515	216	2397	11	620	-	41	-	1516	14	425	21	434	203	45	23	24	4	611	9	19
12	5	77	14	275	1	22	-	3	-	283	1	57	-	35	7	9	-	3	-	79	1	20
14	2	30	15	182	-	48	-	-	-	273	-	34	-	35	14	4	2	3	-	111	-	21
43	3	66	22	365	4	9	-	6	-	42	-	36	2	33	9	3	1	1	1	67	-	22
8	5	78	33	441	1	10	-	9	-	92	-	60	8	75	37	5	4	4	2	29	1	23
3	8	25	16	17	-	18	-	1	-	36	1	19	-	47	21	1	-	2	-	13	-	24
4	2	39	28	10	-	14	-	8	-	32	1	43	-	20	9	2	8	1	1	9	1	25
6	3	35	21	39	-	37	-	1	-	232	1	34	2	60	25	1	1	2	-	18	2	26
7	6	44	17	60	1	7	-	9	-	74	2	30	4	55	25	4	3	-	-	44	1	27
9	3	31	12	111	-	102	-	1	-	117	3	13	-	46	16	4	1	-	-	77	1	28
13	1	-	28	5	223	-	225	-	2	115	-	27	-	33	5	5	-	6	-	95	-	29
1	1	4	13	13	1	-	-	-	-	69	4	7	5	18	26	-	2	-	-	8	2	30
5	3	19	7	442	2	11	-	1	-	130	-	47	-	25	5	4	-	-	-	53	-	31
1	3	39	13	89	1	17	-	-	-	21	-	18	-	12	4	3	1	-	-	8	-	-
79	72	463	232	3238	6	1263	2	48	-	1929	13	384	16	628	300	64	28	64	2	1429	12	32
1	2	33	20	15	-	11	-	1	-	32	-	9	4	47	54	4	1	-	-	19	1	33
1	2	12	4	-	-	25	-	5	-	39	-	20	-	25	2	4	-	1	-	6	-	34
9	-	23	7	32	-	2	-	21	-	72	-	15	-	19	9	1	-	5	1	10	-	35
18	4	24	6	194	-	118	-	-	-	60	-	18	-	13	2	4	-	-	-	223	1	36
3	2	10	4	69	1	8	-	-	-	75	-	16	-	15	-	1	2	2	-	100	-	37
2	1	13	12	55	-	6	-	1	-	152	1	6	1	47	32	5	-	-	-	13	1	38
1	1	11	5	132	1	1	-	-	-	147	-	12	-	15	9	-	-	-	-	9	-	39
1	1	23	7	19	-	1	-	-	-	64	-	21	-	13	7	3	3	4	1	25	1	40
-	-	9	6	63	-	6	-	-	-	55	-	8	1	23	4	4	1	-	-	6	1	41
-	2	12	8	1	-	5	1	-	-	3	-	6	-	14	9	1	-	-	-	2	-	42
2	4	11	5	428	-	104	-	-	-	26	1	6	-	14	5	1	-	1	-	47	-	43
1	2	15	5	44	-	60	-	1	-	8	-	6	-	12	9	-	-	2	-	27	2	44
2	3	11	5	46	-	1	-	1	-	136	1	23	-	3	3	-	-	-	-	6	-	45
1	-	17	10	59	-	27	-	-	-	150	1	13	-	24	14	3	3	2	-	-	-	46
3	-	17	5	44	-	24	-	-	-	52	2	9	1	7	-	-	-	-	-	-	-	47
3	4	14	2	262	-	49	-	-	-	58	-	13	-	11	8	2	1	2	-	142	1	48
2	1	4	2	2	-	-	-	-	-	45	-	11	-	7	4	-	-	2	-	73	4	49
1	-	12	4	165	1	3	-	-	-	57	1	11	-	9	2	1	1	6	-	11	-	50
1	1	11	5	132	1	1	-	-	-	64	-	7	1	18	41	-	1	3	-	26	1	51
-	-	9	6	63	-	6	-	-	-	30	-	4	-	5	3	1	1	-	-	86	-	52
-	2	12	8	1	-	5	1	-	-	21	1	3	-	9	7	-	-	-	-	3	-	53
-	4	11	5	428	-	104	-	-	-	81	1	15	-	4	1	-	1	1	-	15	-	54
2	4	11	5	44	-	60	-	1	-	26	1	6	-	14	5	1	-	1	-	47	-	55
1	2	15	5	46	-	1	-	1	-	8	-	6	-	12	9	-	-	2	-	27	2	44
1	-	17	10	59	-	27	-	-	-	150	1	13	-	24	14	3	3	2	-	-	-	45
3	-	17	5	44	-	24	-	-	-	52	2	9	1	7	-	-	-	-	-	-	-	46
3	4	14	2	262	-	49	-	-	-	58	-	13	-	11	8	2	1	2	-	142	1	47
2	1	4	2	2	-	-	-	-	-	45	-	11	-	7	4	-	-	2	-	73	4	48
1	-	12	4	165	1	3	-	-	-	57	1	11	-	9	2	1	1	6	-	11	-	49
1	1	11	5	132	1	1	-	-	-	64	-	7	1	18	41	-	1	3	-	26	1	50
-	-	9	6	63	-	6	-	-	-	30	-	4	-	5	3	1	1	-	-	86	-	51
-	2	12	8	1	-	5	1	-	-	21	1	3	-	9	7	-	-	-	-	3	-	52
-	4	11	5	428	-	104	-	-	-	81	1	15	-	4	1	-	1	1	-	15	-	53
2	4	11	5	44	-	60	-	1	-	26	1	6	-	14	5	1	-	1	-	47	-	54
1	2	15	5	46	-	1	-	1	-	8	-	6	-	12	9	-	-	2	-	27	2	44
1	-	17	10	59	-	27	-	-	-	150	1	13	-	24	14	3	3	2	-	-	-	45
3	-	17	5	44	-	24	-	-	-	52	2	9										

## Cases and Deaths from Diseases Dangerous

Line No.	CITIES AND TOWNS IN ORDER OF POPULATION	Popu- lation esti- mated as of July 1, 1931	An- terior Polio- mye- litis		Chicken Pox		Diph- theria		Ep. Cere- bro- spinal Menin- gitis		Ger- man Mea- sles		Gonor- rhea	
			Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths
69	Easthampton . . . . .	11,258	17	-	1	-	-	-	-	-	-	-	21	-
70	Fairhaven . . . . .	10,981	3	-	17	-	11	1	-	-	-	-	21	-
71	Athol . . . . .	10,945	6	-	7	-	-	-	-	-	-	-	6	-
72	Swampscott . . . . .	10,693	5	-	12	-	5	-	-	-	23	-	9	-
73	Stoneham . . . . .	10,302	1	-	15	-	2	-	-	-	-	-	19	-
74	North Attleboro . . . . .	10,297	3	-	-	-	-	-	-	-	6	-	3	-
75	Reading . . . . .	10,035	6	-	6	-	1	-	1	-	-	-	7	-
	CITIES AND TOWNS OF 5,000-10,000	342,320	139	3	793	-	115	7	3	-	336	-	303	-
76	Andover . . . . .	9,890	2	-	3	-	1	-	-	-	15	-	11	-
77	Lexington . . . . .	9,887	3	-	77	-	3	-	-	-	-	-	7	-
78	Northbridge . . . . .	9,629	3	-	-	-	1	-	-	-	-	-	4	-
79	Palmer . . . . .	9,212	3	-	7	-	5	-	-	-	-	-	6	-
80	Bridgewater . . . . .	8,954	2	-	44	-	1	-	1	-	20	-	10	-
81	Ludlow . . . . .	8,893	4	-	65	-	1	-	-	-	-	-	7	-
82	Marblehead . . . . .	8,770	-	-	31	-	2	-	-	-	-	-	11	-
83	Dartmouth . . . . .	8,717	3	-	61	-	7	-	-	-	-	-	6	-
84	Hudson . . . . .	8,552	-	-	44	-	1	-	-	-	4	-	9	-
85	Middleboro . . . . .	8,482	6	-	118	-	1	-	-	-	3	-	2	-
86	Stoughton . . . . .	8,289	2	-	18	-	-	-	-	-	1	-	4	-
87	Montague . . . . .	8,108	5	1	-	-	6	1	-	-	-	-	3	-
88	Barnstable . . . . .	7,644	5	1	53	-	5	1	-	-	16	-	21	-
89	Whitman . . . . .	7,584	2	-	4	-	-	-	-	-	3	-	3	-
90	Concord . . . . .	7,582	1	-	18	-	-	-	-	-	2	-	10	-
91	Walpole . . . . .	7,463	4	-	8	-	1	-	-	-	65	-	1	-
92	Rockland . . . . .	7,415	3	-	1	-	1	-	-	-	-	-	4	-
93	Agawam . . . . .	7,296	12	-	1	-	-	-	-	-	-	-	13	-
94	Shrewsbury . . . . .	7,181	-	-	1	-	1	-	1	-	1	-	2	-
95	Chelmsford . . . . .	7,133	1	-	12	-	1	-	-	-	3	-	2	-
96	Millbury . . . . .	7,085	4	-	8	-	9	-	-	-	35	-	6	-
97	Ware . . . . .	7,075	5	-	-	-	1	-	-	-	-	-	6	-
98	Grafton . . . . .	7,043	2	-	-	-	-	-	-	-	3	-	2	-
99	Dracut . . . . .	7,039	-	-	-	-	1	2	-	-	-	-	1	-
100	Franklin . . . . .	7,022	-	-	7	-	-	-	-	-	-	-	7	-
101	Maynard . . . . .	6,993	-	-	-	-	-	-	-	-	-	-	6	-
102	North Andover . . . . .	6,991	1	-	25	-	3	-	-	-	32	-	3	-
103	South Hadley . . . . .	6,813	9	-	3	-	-	-	-	-	-	-	-	-
104	Hingham . . . . .	6,781	1	-	-	-	2	-	-	-	1	-	7	-
105	Randolph . . . . .	6,779	-	-	10	-	-	-	-	-	1	-	6	-
106	Auburn . . . . .	6,451	1	-	23	-	-	-	-	-	36	-	3	-
107	Westboro . . . . .	6,424	1	-	1	-	3	-	-	-	10	-	11	-
108	Uxbridge . . . . .	6,312	8	-	8	-	3	1	-	-	-	-	11	-
109	Mansfield . . . . .	6,309	1	1	2	-	3	-	-	-	36	-	5	-
110	Spencer . . . . .	6,211	-	-	3	-	5	-	-	-	1	-	1	-
111	Winchendon . . . . .	6,208	-	-	2	-	1	-	1	-	1	-	13	-
112	Billerica . . . . .	6,121	2	-	1	-	1	-	-	-	-	-	9	-
113	Abington . . . . .	5,871	2	-	-	-	4	-	-	-	-	-	1	-
114	Amherst . . . . .	5,868	13	-	23	-	-	-	-	-	3	-	5	-
115	Great Barrington . . . . .	5,818	4	-	15	-	-	-	-	-	7	-	6	-
116	Canton . . . . .	5,797	6	-	27	-	2	-	-	-	4	-	7	-
117	Tewksbury . . . . .	5,735	-	-	6	-	1	-	-	-	-	-	4	-
118	Wareham . . . . .	5,708	9	-	18	-	5	1	-	-	2	-	19	-
119	Somerset . . . . .	5,541	-	-	-	-	4	-	-	-	-	-	6	-
120	Ipswich . . . . .	5,485	-	-	17	-	27	1	-	-	-	-	1	-
121	Foxboro . . . . .	5,448	-	-	5	-	-	-	-	-	67	-	7	-
122	Orange . . . . .	5,420	5	-	1	-	-	-	-	-	-	-	5	-
123	Easton . . . . .	5,291	4	-	22	-	2	-	-	-	14	-	9	-
	CITIES AND TOWNS OF 2,500-5,000	199,221	74	1	440	-	60	4	3	1	104	-	162	-
124	Seekonk . . . . .	4,904	1	-	-	-	1	-	-	-	-	-	1	-
125	Monson . . . . .	4,877	7	-	3	-	-	-	-	-	-	-	-	-
126	Falmouth . . . . .	4,852	5	-	20	-	13	-	-	-	1	-	17	-
127	Longmeadow . . . . .	4,707	4	-	22	-	-	-	-	-	-	-	5	-
128	Blackstone . . . . .	4,643	1	-	-	-	-	1	-	-	-	-	-	-
129	Leicester . . . . .	4,527	1	-	-	-	1	-	-	-	-	-	4	-
130	Westport . . . . .	4,457	-	-	5	-	-	-	-	-	-	-	3	-
131	Dalton . . . . .	4,251	-	-	-	-	-	-	-	-	-	-	1	-
132	Dudley . . . . .	4,185	1	-	3	-	-	-	-	-	-	-	1	-
133	Wilmington . . . . .	4,137	-	-	2	-	-	-	-	-	-	-	6	-
134	Medfield . . . . .	4,115	-	-	-	-	6	-	-	-	-	-	4	-
135	Swansea . . . . .	4,113	1	-	-	-	-	-	-	-	-	-	-	-
136	Templeton . . . . .	4,109	3	-	33	-	-	-	-	-	-	-	9	-
137	Acushnet . . . . .	4,082	1	-	-	-	7	-	-	-	-	-	1	-
138	Lee . . . . .	4,061	2	-	1	-	-	-	-	-	-	-	8	-
139	Holden . . . . .	3,978	3	-	69	-	4	-	-	-	11	-	4	-
140	Oxford . . . . .	3,924	3	-	5	-	5	-	-	-	-	-	1	-



to the Public Health, 1931—Continued

[illegible]



[illegible]



### Cases and Deaths from Diseases Dangerous

[illegible]



## Cases and Deaths from Diseases Dangerous

Line No.	CITIES AND TOWNS IN ORDER OF POPULATION	Popu- lation esti- mated as of July 1, 1931	An- terior Poli- mye- litis		Chicken Pox		Diph- theria		Ep. Cere- bro- spinal Mening- itis		Ger- man Mea- sles		Gonor- rhea	
			Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths
287	New Marlboro . . . . .	833	3	-	6	-	-	-	-	-	-	-	-	-
288	Wellfleet . . . . .	831	-	1	-	-	-	-	-	-	-	-	1	-
289	Charlemont . . . . .	816	-	-	-	-	-	-	-	-	-	-	-	-
290	Brewster . . . . .	769	-	-	-	-	-	-	-	-	-	-	-	-
291	Bolton . . . . .	756	-	-	-	-	-	-	-	-	-	-	-	-
292	Halifax . . . . .	756	-	-	-	-	-	-	-	-	-	-	-	-
293	Royalston . . . . .	726	-	-	-	-	-	-	-	-	-	-	2	-
294	Princeton . . . . .	710	-	-	-	-	-	-	-	-	-	-	-	-
295	Hampden . . . . .	696	-	-	-	-	-	-	-	-	-	-	-	-
296	Faxton . . . . .	691	-	-	-	-	-	-	-	-	-	-	-	-
297	Granville . . . . .	689	1	-	-	-	-	-	-	-	-	-	-	-
298	Leverett . . . . .	679	-	-	-	-	-	-	-	-	-	-	-	-
299	Boxford . . . . .	668	-	-	-	-	-	-	-	-	-	-	1	-
300	Petersham . . . . .	658	1	-	11	-	-	-	-	-	-	-	-	-
301	Becket . . . . .	647	-	-	-	-	-	-	-	-	1	-	2	-
302	Carlisle . . . . .	582	-	-	-	-	-	-	-	-	-	-	1	-
303	Richmond . . . . .	574	-	-	-	-	-	-	-	-	-	-	-	-
304	Blandford . . . . .	572	1	-	-	-	-	-	-	-	-	-	-	-
305	Cummington . . . . .	535	-	-	-	-	-	-	-	-	-	-	-	-
306	Egremont . . . . .	521	-	-	1	-	-	-	-	-	3	-	-	-
307	Truro . . . . .	514	-	-	-	-	-	-	-	-	-	-	8	-
308	Plympton . . . . .	511	-	-	-	-	-	-	-	-	-	-	-	-
309	Oakham . . . . .	498	-	-	-	-	-	-	-	-	-	-	-	-
310	Worthington . . . . .	498	-	-	2	-	-	-	-	-	2	-	1	-
311	Dana . . . . .	468	-	-	-	-	-	-	-	-	1	-	2	-
312	Eastham . . . . .	455	-	-	3	-	-	-	-	-	-	-	-	-
313	Pelham . . . . .	440	1	-	6	-	-	-	-	-	-	-	-	-
314	Enfield . . . . .	435	-	-	2	-	-	-	-	-	-	-	-	-
315	Chesterfield . . . . .	415	-	-	5	-	-	-	-	-	1	-	-	-
316	New Braintree . . . . .	405	-	-	-	-	-	-	-	-	-	-	-	-
317	New Salem . . . . .	399	1	-	3	-	-	-	-	-	-	-	-	-
318	Sandisfield . . . . .	399	-	-	-	-	-	-	-	-	-	-	-	-
319	Dunstable . . . . .	394	-	-	-	-	-	-	-	-	-	-	-	-
320	Windsor . . . . .	387	-	-	-	-	-	-	-	-	-	-	2	-
321	Westhampton . . . . .	382	2	-	-	-	-	-	-	-	-	-	-	-
322	Mashpee . . . . .	376	-	-	-	-	-	-	-	-	-	-	-	-
323	Warwick . . . . .	368	-	-	-	-	-	-	-	-	-	-	-	-
324	Otis . . . . .	363	-	-	-	-	-	-	-	-	-	-	3	-
325	Phillipston . . . . .	353	-	-	-	-	-	-	-	-	-	-	-	-
326	Wendell . . . . .	343	-	-	5	-	-	-	-	-	-	-	-	-
327	Wales . . . . .	342	-	-	-	-	-	-	-	-	-	-	-	-
328	Heath . . . . .	338	-	-	-	-	-	-	-	-	-	-	-	-
329	Hancock . . . . .	326	-	-	-	-	1	-	-	-	-	-	-	-
330	Monterey . . . . .	316	-	-	-	-	-	-	-	-	-	-	-	-
331	Plainfield . . . . .	312	-	-	-	-	-	-	-	-	-	-	-	-
332	Boxboro . . . . .	309	-	-	-	-	-	-	-	-	-	-	-	-
333	Hawley . . . . .	304	1	-	-	-	-	-	-	-	-	-	-	-
334	Rowe . . . . .	299	-	-	-	-	-	-	-	-	-	-	1	-
335	Florida . . . . .	295	-	-	-	-	-	-	-	-	-	-	-	-
336	Savoy . . . . .	288	-	-	-	-	-	-	-	-	-	-	-	-
337	Leyden . . . . .	260	-	-	-	-	-	-	-	-	-	-	-	-
338	West Tisbury . . . . .	255	-	-	-	-	-	-	-	-	-	-	-	-
339	Chilmark . . . . .	254	-	-	3	-	-	-	-	-	-	-	-	-
340	Goshen . . . . .	248	-	-	-	-	-	-	-	-	-	-	-	-
341	Tyringham . . . . .	239	-	-	-	-	-	-	-	-	-	-	1	-
342	Monroe . . . . .	235	-	-	-	-	-	-	-	-	-	-	-	-
343	Shutesbury . . . . .	224	-	-	-	-	-	-	-	-	-	-	-	-
344	Washington . . . . .	221	-	-	-	-	-	-	-	-	-	-	-	-
345	Alford . . . . .	197	1	-	-	-	-	-	-	-	-	-	-	-
346	Middlefield . . . . .	192	-	-	-	-	-	-	-	-	-	-	-	-
347	Greenwich . . . . .	186	-	-	-	-	-	-	-	-	-	-	-	-
348	Gay Head . . . . .	160	-	-	1	-	1	-	-	-	-	-	-	-
349	Holland . . . . .	137	-	-	-	-	-	-	-	-	-	-	-	-
350	Tolland . . . . .	132	-	-	-	-	-	-	-	-	-	-	1	-
351	Montgomery . . . . .	130	-	-	-	-	-	-	-	-	-	-	-	-
352	Gosnold . . . . .	116	-	-	-	-	-	-	-	-	-	-	2	-
353	Peru . . . . .	107	-	-	-	-	-	-	-	-	-	-	-	-
354	New Ashford . . . . .	75	-	-	-	-	-	-	-	-	-	-	-	-
355	Mount Washington . . . . .	60	-	-	-	-	-	-	-	-	-	-	-	-
356	Tewksbury State Infirmary . . . . .	-	-	-	1	-	3	1	-	-	-	-	-	-



## to the Public Health, 1931—Concluded

Influenza		Lobar Pneumonia		Measles		Mumps		Ophthalmia Neonatorum		Scarlet Fever		Syphilis		Tuberculosis, Pulmonary		Tuberculosis, Other Forms		Typhoid Fever		Whooping Cough		Line No.
Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	
-	-	-	-	-	-	2	-	-	-	-	-	1	-	-	-	-	-	-	-	1	-	287
-	-	-	-	25	-	1	-	-	-	-	-	1	-	-	-	-	-	-	-	1	-	288
-	1	1	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	289
-	1	-	1	-	-	-	-	-	-	4	-	1	-	-	-	-	-	-	-	-	-	290
-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	291
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	292
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	293
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	294
-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	295
-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	296
-	-	1	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	297
-	-	-	-	55	-	-	-	-	-	-	-	1	1	-	-	-	-	-	-	-	-	298
-	-	6	-	6	-	6	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	299
-	-	-	-	1	-	-	-	-	-	2	-	-	-	1	-	-	-	-	-	-	-	300
-	-	-	-	1	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	301
-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	302
-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	303
-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	304
-	-	-	1	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	4	-	305
-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	306
-	1	1	-	-	-	-	-	-	-	-	1	1	-	-	-	-	-	-	-	-	-	307
-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	308
-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	309
-	1	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	310
-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	311
9	-	-	1	-	-	3	-	-	-	2	-	1	-	1	-	-	-	-	-	-	-	312
-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	313
-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	314
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	315
-	-	-	1	-	-	1	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	316
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	317
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	318
-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	319
-	-	1	1	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	320
-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	321
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	322
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	323
-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	324
-	-	-	-	1	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	325
-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	326
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	327
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	328
-	-	1	-	-	-	5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	329
-	-	-	-	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	330
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	331
-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	332
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	333
-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	334
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	335
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	336
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	337
-	-	-	-	-	-	-	-	-	-	7	-	-	-	-	-	-	-	-	-	-	-	338
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	339
-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	340
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	341
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	342
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	343
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	344
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	345
9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	346
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	347
-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	348
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	349
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	350
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	351
-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	352
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	353
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	354
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	355
17	-	6	33	-	-	-	-	-	-	3	-	-	-	4	76	115	2	-	-	-	-	356

In addition to the foregoing  
there occurred 5 cases of *actin-*  
*omycosis* with 1 death:

	Cases	Deaths
Boston	4	1
Foxboro	1	-

15 cases of *anthrax* with 1 death:

Boston	1	1
Greenfield	1	-
Haverhill	3	-
Lawrence	1	-
Lynn	3	-
Newburyport	1	-
Peabody	4	-
Salem	1	-

6,878 cases of *dog bile*:

Acushnet	1	-
Adams	14	-
Agawam	9	-
Amesbury	16	-
Amherst	19	-
Arlington	86	-
Ashfield	1	-
Athol	4	-
Attleboro	50	-
Auburn	6	-
Barnstable	19	-
Becket	3	-
Belchertown	2	-
Bellingham	1	-
Belmont	54	-
Beverly	27	-
Boston	2,268	-
Braintree	47	-
Brewster	4	-
Bridgewater	7	-
Brimfield	2	-
Brockton	45	-
Brookfield	3	-
Brookline	19	-
Cambridge	310	-
Canton	21	-
Chelmsford	16	-
Chelsea	49	-
Chicopee	62	-
Clarksburg	3	-
Clinton	25	-
Cohasset	2	-
Colrain	3	-
Concord	6	-
Danvers	11	-
Dartmouth	30	-
Dedham	25	-
Deerfield	3	-
Dighton	1	-
Dover	1	-
Dudley	1	-
East Longmeadow	4	-
Eastham	1	-
Easton	4	-
Erving	1	-
Everett	57	-
Fairhaven	14	-
Fall River	132	-
Falmouth	26	-
Fitchburg	28	-
Foxboro	6	-
Framingham	54	-
Franklin	17	-
Gardner	4	-
Georgetown	1	-
Gloucester	35	-
Great Barrington	3	-
Greenfield	33	-
Hadley	1	-
Hanover	2	-
Harwich	4	-
Hatfield	5	-
Haverhill	107	-
Holbrook	8	-
Holden	13	-
Holliston	6	-
Holyoke	35	-
Hopkinton	9	-
Hudson	5	-
Hull	1	-
Ipswich	6	-

	Cases	Deaths
Kingston	1	-
Lancaster	9	-
Lawrence	113	-
Lee	4	-
Leicester	1	-
Lenox	6	-
Leominster	3	-
Lexington	25	-
Lincoln	5	-
Longmeadow	14	-
Lowell	169	-
Ludlow	6	-
Lunenburg	1	-
Lynn	126	-
Malden	101	-
Manchester	1	-
Mansfield	9	-
Marblehead	19	-
Marion	2	-
Marlborough	24	-
Mattapoisett	10	-
Medford	92	-
Melrose	29	-
Mendon	3	-
Merrimac	2	-
Methuen	29	-
Millford	25	-
Millbury	23	-
Millis	9	-
Milton	18	-
Montague	7	-
Monterey	1	-
Natick	1	-
Needham	35	-
New Bedford	92	-
New Marlborough	3	-
Newbury	1	-
Newburyport	23	-
Newton	62	-
North Adams	14	-
North Andover	9	-
North Brookfield	1	-
Northampton	66	-
Northbridge	2	-
Northfield	3	-
Norwood	14	-
Orange	2	-
Orleans	2	-
Palmer	11	-
Peabody	41	-
Pittsfield	1	-
Plymouth	10	-
Quincy	73	-
Randolph	6	-
Revere	89	-
Rockport	12	-
Russell	1	-
Salem	5	-
Sandwich	3	-
Saugus	7	-
Seekonk	1	-
Sharon	3	-
Shelburne	1	-
Sherborn	2	-
Shirley	2	-
Somerset	1	-
Somerville	110	-
South Hadley	1	-
Southampton	1	-
Southborough	3	-
Southbridge	1	-
Southwick	1	-
Spencer	9	-
Springfield	272	-
Stockbridge	4	-
Stoneham	28	-
Stoughton	3	-
Sutton	2	-
Swampscott	33	-
Taunton	24	-
Templeton	4	-
Topsfield	1	-
Truro	1	-
Tyngsboro	9	-
Upton	2	-
Uxbridge	3	-
Wakefield	1	-
Walpole	4	-

	Cases	Deaths		Cases	Deaths
Waltham . . . . .	91	-	New Bedford . . . . .	1	-
Wareham . . . . .	6	-	Pittsfield . . . . .	1	-
Warren . . . . .	3	-	Somerville . . . . .	1	-
Watertown . . . . .	68	-	Worcester . . . . .	3	-
Wayland . . . . .	7	-	<i>Therapeutic cases:</i>		
Webster . . . . .	1	-	Belmont . . . . .	1	-
Wellesley . . . . .	49	-	Boston . . . . .	1	-
West Brookfield . . . . .	10	-	Fall River . . . . .	2	-
West Springfield . . . . .	2	-	Taunton . . . . .	1	-
Westborough . . . . .	12	-	6 cases of <i>paratyphoid fever</i> with		
Westfield . . . . .	30	-	1 death:		
Westford . . . . .	1	-	Boston . . . . .	2	-
Westhampton . . . . .	1	-	Fall River . . . . .	1	-
Veston . . . . .	15	-	Holyoke . . . . .	-	1
Westwood . . . . .	2	-	Norwood . . . . .	1	-
Weymouth . . . . .	19	-	Southbridge . . . . .	1	-
Whitman . . . . .	1	-	Worcester . . . . .	1	-
Williamsburg . . . . .	1	-	25 cases of <i>pellagra</i> with 16		
Williamstown . . . . .	1	-	deaths:		
Winchester . . . . .	25	-	Beverly . . . . .	1	1
Winthrop . . . . .	53	-	Boston . . . . .	8	6
Woburn . . . . .	9	-	Canton . . . . .	1	-
Worcester . . . . .	527	-	Chelsea . . . . .	-	1
Wrentham . . . . .	1	-	Fall River . . . . .	1	-
Yarmouth . . . . .	2	-	Haverhill . . . . .	1	-
26 cases of <i>dysentery</i> with 5 deaths:			Holyoke . . . . .	1	1
<i>Amebic:</i>			Melrose . . . . .	1	1
Ayer . . . . .	-	1	Milford . . . . .	1	-
Boston . . . . .	2	-	New Bedford . . . . .	1	-
Lynn . . . . .	1	-	Northampton . . . . .	4	1
Malden . . . . .	1	-	Peabody . . . . .	1	1
Worcester . . . . .	1	-	Quincy . . . . .	-	1
<i>Bacillary:</i>			Taunton . . . . .	-	1
Boston . . . . .	7	2	Tewksbury . . . . .	1	1
Cambridge . . . . .	2	-	Winchester . . . . .	1	-
Everett . . . . .	1	-	Worcester . . . . .	2	1
Lynn . . . . .	1	-	4 cases of <i>rabies</i> with 4 deaths:		
Somerville . . . . .	2	-	Millbury . . . . .	1	1
Winchester . . . . .	1	1	Waltham . . . . .	1	1
Worcester . . . . .	1	1	Watertown . . . . .	1	1
Westborough . . . . .			Westborough . . . . .	1	1
Not stated:			226 cases of <i>septic sore throat</i>		
Boston . . . . .	2	-	with 46 deaths:		
Essex . . . . .	3	-	Arlington . . . . .	3	-
New Bedford . . . . .	1	-	Attleboro . . . . .	1	1
34 cases of <i>encephalitis lethargica</i>			Belmont . . . . .	2	-
with 24 deaths:			Beverly . . . . .	8	1
Adams . . . . .	1	1	Boston . . . . .	80	12
Ayer . . . . .	-	1	Brookline . . . . .	4	1
Arlington . . . . .	1	1	Cambridge . . . . .	7	3
Belmont . . . . .	1	-	Chelsea . . . . .	-	1
Beverly . . . . .	1	-	Clinton . . . . .	1	-
Boston . . . . .	7	4	Danvers . . . . .	2	-
Brockton . . . . .	2	1	Everett . . . . .	2	-
Brookline . . . . .	1	1	Fairhaven . . . . .	1	-
Cambridge . . . . .	2	-	Fall River . . . . .	5	-
Colrain . . . . .	1	-	Fitchburg . . . . .	1	-
Dartmouth . . . . .	1	-	Frammingham . . . . .	3	-
Gardner . . . . .	1	-	Gardner . . . . .	4	-
Haverhill . . . . .	1	1	Gill . . . . .	1	-
Holyoke . . . . .	-	1	Greenfield . . . . .	2	-
Lynn . . . . .	1	1	Haverhill . . . . .	4	2
Malden . . . . .	-	1	Hingham . . . . .	-	1
Nahant . . . . .	-	1	Holyoke . . . . .	1	1
New Bedford . . . . .	1	2	Ispswich . . . . .	1	-
Needham . . . . .	1	1	Kingston . . . . .	1	-
Newton . . . . .	1	-	Lakeville . . . . .	1	-
North Andover . . . . .	1	-	Leominster . . . . .	1	-
Northampton . . . . .	1	-	Lexington . . . . .	2	-
Quincy . . . . .	4	3	Lowell . . . . .	5	5
Salem . . . . .	-	1	Lynn . . . . .	2	-
Swampscott . . . . .	1	-	Malden . . . . .	9	1
Wellesley . . . . .	1	1	Marion . . . . .	3	-
West Springfield . . . . .	-	1	Marshfield . . . . .	1	-
Worcester . . . . .	2	1	Maynard . . . . .	2	-
1 case of <i>hookworm</i> :			Medford . . . . .	4	-
Cambridge . . . . .	1	-	Melrose . . . . .	3	2
1 case of <i>leprosy</i> :			Middleborough . . . . .	-	1
Boston . . . . .	1	-	New Bedford . . . . .	2	1
18 cases of <i>malaria</i> with 2 deaths:			Newton . . . . .	1	-
Boston . . . . .	2	1	North Andover . . . . .	1	-
Chelsea . . . . .	5*	-	Northampton . . . . .	15	1
Frammingham . . . . .	-	1	Northfield . . . . .	3	-
			Pittsfield . . . . .	3	3
			Plymouth . . . . .	2	-

	Cases	Deaths		Cases	Deaths
Quincy . . . . .	3	2	Brockton . . . . .	7	-
Revere . . . . .	1	-	Cambridge . . . . .	25	-
Salem . . . . .	-	1	Carlisle . . . . .	2	-
Sharon . . . . .	1	-	Chelmsford . . . . .	7	-
Somerville . . . . .	1	2	Chelsea . . . . .	2	-
Springfield . . . . .	1	-	Cheshire . . . . .	1	-
Stoneham . . . . .	1	1	Chicopee . . . . .	2	-
Swansea . . . . .	-	1	Colrain . . . . .	1	-
Taunton . . . . .	1	-	Deerfield . . . . .	1	-
Templeton . . . . .	1	-	Easthampton . . . . .	1	-
Wakefield . . . . .	1	-	Everett . . . . .	2	-
Waltham . . . . .	4	1	Fall River . . . . .	10	-
Wareham . . . . .	2	-	Fitchburg . . . . .	13	-
Warren . . . . .	1	-	Framingham . . . . .	5	-
Watertown . . . . .	4	-	Franklin . . . . .	1	-
Wilmington . . . . .	1	-	Gardner . . . . .	1	-
Winchester . . . . .	1	-	Grafton . . . . .	1	-
Winthrop . . . . .	1	1	Hatfield . . . . .	1	-
Woburn . . . . .	1	-	Haverhill . . . . .	4	-
Worcester . . . . .	6	-	Hinsdale . . . . .	4	-
6 cases of <i>smallpox</i> :			Holyoke . . . . .	4	-
Williamstown . . . . .	6	-	Hudson . . . . .	5	-
24 cases of <i>tetanus</i> with 21 deaths:			Lancaster . . . . .	2	-
Arlington . . . . .	1	-	Lanesborough . . . . .	3	-
Boston . . . . .	5	3	Lawrence . . . . .	143	-
Chicopee . . . . .	1	-	Lee . . . . .	1	-
East Longmeadow . . . . .	-	-	Lenox . . . . .	1	-
Fall River . . . . .	3	2	Leominster . . . . .	1	-
Great Barrington . . . . .	-	1	Lowell . . . . .	119	-
Harwich . . . . .	1	1	Ludlow . . . . .	1	-
Holyoke . . . . .	1	1	Lynn . . . . .	11	-
Lexington . . . . .	1	-	Malden . . . . .	6	-
Melrose . . . . .	1	1	Mansfield . . . . .	1	-
Monterey . . . . .	1	-	Medford . . . . .	5	-
Newburyport . . . . .	-	3	Melrose . . . . .	1	-
Northampton . . . . .	1	1	Methuen . . . . .	25	-
Pittsfield . . . . .	1	1	Milford . . . . .	8	-
Plymouth . . . . .	-	1	Montague . . . . .	2	-
Rockland . . . . .	1	-	Needham . . . . .	2	-
Saugus . . . . .	1	-	New Bedford . . . . .	6	-
Springfield . . . . .	2	4	Newburyport . . . . .	2	-
Taunton . . . . .	-	1	Newton . . . . .	1	-
Winthrop . . . . .	1	-	North Adams . . . . .	14	-
Worcester . . . . .	1	1	North Andover . . . . .	8	-
40 cases of <i>trachoma</i> :			Pittsfield . . . . .	54	-
Arlington . . . . .	1	-	Quincy . . . . .	9	-
Boston . . . . .	21	-	Reading . . . . .	2	-
Brockton . . . . .	1	-	Revere . . . . .	2	-
Cambridge . . . . .	2	-	Salem . . . . .	1	-
Chelsea . . . . .	2	-	Saugus . . . . .	1	-
Fairhaven . . . . .	1	-	Somerville . . . . .	10	-
Gardner . . . . .	1	-	Springfield . . . . .	12	-
Lawrence . . . . .	1	-	Sutton . . . . .	1	-
Lowell . . . . .	1	-	Taunton . . . . .	1	-
Malden . . . . .	1	-	Tyngsboro . . . . .	1	-
Methuen . . . . .	1	-	Tewksbury State Infirmary . . . . .	1	-
North Adams . . . . .	1	-	Uxbridge . . . . .	4	-
Springfield . . . . .	1	-	Wakefield . . . . .	1	-
Stow . . . . .	1	-	Watertown . . . . .	7	-
Watertown . . . . .	1	-	West Stockbridge . . . . .	1	-
Worcester . . . . .	3	-	Wilbraham . . . . .	5	-
14 cases of <i>trichinosis</i> :			Winthrop . . . . .	1	-
Belmont . . . . .	1	-	Wrentham . . . . .	1	-
Boston . . . . .	4	-	1 case of <i>typhus fever</i> :		
Brockton . . . . .	1	-	Boston . . . . .	1	-
Chicopee . . . . .	2	-	15 cases of <i>undulant fever</i> :		
Framingham . . . . .	4	-	Attleboro . . . . .	1	-
Haverhill . . . . .	1	-	Framingham . . . . .	1	-
North Adams . . . . .	1	-	Gloucester . . . . .	1	-
684 cases of <i>tuberculosis hilum</i> :			Greenfield . . . . .	2	-
Adams . . . . .	4	-	Mansfield . . . . .	1	-
Andover . . . . .	5	-	Oak Bluffs . . . . .	1	-
Arlington . . . . .	4	-	Salem . . . . .	1	-
Attleboro . . . . .	1	-	Shelburne . . . . .	1	-
Belmont . . . . .	3	-	Stoneham . . . . .	1	-
Boston . . . . .	89	-	Sudbury . . . . .	1	-
			Williamstown . . . . .	1	-
			Worcester . . . . .	3	-

\*Imported cases

## MASSACHUSETTS STATISTICS FOR 1931

Population (Estimated as of July 1, 1931)	4,275,966
Death rate per 1,000 population	11.4
Infant mortality (per 1,000 live births)	54.0



## REPORT OF DIVISION OF FOOD AND DRUGS

HERMANN C. LYTHGOE, *Director*

The Food and Drug Division during the year 1931 has been engaged in the usual activities relative to the enforcement of the laws pertaining to the sale of milk, foods, and drugs; the slaughtering laws, the cold storage laws; the bakery law, and the mattress law; in the inspection of pasteurization plants; as well as in the examination of liquor and chemical samples submitted by Police Departments.

It was found necessary to make 324 prosecutions during the year. Of these cases, 307 resulted in conviction; 11 were found not guilty; 2 were placed on file without finding; and 4 were dismissed. There were 44 prosecutions for the sale of low standard milk, many of which were against restaurant proprietors who were serving skimmed milk instead of whole milk to their guests. Some cases were brought against producers, who, after warning, failed to bring the quality of milk which they were selling up to the legal standard. Other cases were brought against milk dealers, who, after warning, did not bring the milk which they were selling up to legal standard. Forty-three of these cases resulted in conviction; 1 case was dismissed. There were 10 cases for the sale of milk as pure milk from which a portion of the cream had been removed, all cases resulting in conviction. These cases were brought either against retail milk dealers or against producers. There were 10 cases for the sale of milk containing added water. Two of the cases were against retail milk dealers, and 8 against producers. There was 1 case for the sale of skimmed milk without properly labeling the container. There were 5 cases for the sale of unpasteurized milk as pasteurized, of which 4 resulted in conviction and 1 in a finding of not guilty. In this latter case it was shown that milk was being pasteurized at 139.4° instead of between 140° and 145°. There were 21 cases for violation of the regulations relative to the operation of pasteurization plants. Of these cases, 19 resulted in conviction; 1 was placed on file without finding; and 1 was dismissed. The bulk of these cases related to unsanitary conditions in the plants and to operation in such a manner that unpasteurized milk would find its way into the finished product. There were 6 cases relative to the sale of Grade A milk. Five of these 6 cases resulted in conviction and related to the sale of Grade A milk containing less than 4 per cent of fat. The other case was discharged and related to labeling the milk as being pasteurized twenty-four hours later than it was pasteurized. In this instance, the employee testified with perfect truth that he was of the opinion that the milk he capped had been pasteurized that day and was not milk from which some other employee had removed the caps and recapped the bottles. There was 1 case for the sale of watered clams, resulting in conviction; and 6 cases for the sale of sewage polluted clams, 5 of which resulted in conviction, and 1 in a finding of not guilty. There were 33 cases for the sale of Hamburg steak containing sulphite preservatives without labeling the package; 1 case was dismissed and the rest of the cases resulted in conviction. There was 1 conviction for the sale of adulterated maple syrup. There was 1 case for the sale of diseased meat, resulting in conviction. There were 27 cases for the sale of sausages containing excess starch; 1 case was dismissed; 1 resulted in a finding of not guilty; and 25 in conviction. There were 22 cases for the sale of decomposed food, of which 2 resulted in a finding of not guilty and 20 in conviction. These foods were corned beef, eggs, Hamburg steak, liver, roasting pork, and sausage. The false advertising law is used more or less in connection with improper representation of food. There were 17 cases relating to false advertising of alleged fresh eggs; 1 case was filed without finding, and 16 resulted in convictions. There were 11 convictions for false advertising of maple syrup by restaurants. There was 1 conviction for the false advertising of maple sugar by a retail dealer and 1 conviction for false advertising of an alleged fresh killed fowl. There was 1 conviction for violation of the sanitary food law. There were 23 prosecutions for the sale of drugs deficient in strength, of which 22 resulted in conviction and 1 in a finding of not guilty. The cases relative to violation of the cold storage law were all for the sale of cold storage eggs without marking the container. Two defendants were found not guilty, and 66 were convicted. There were 5 cases for violation of the slaughtering laws, 4 defendants being convicted and 1 found not guilty. There were 7 convictions for violation of the mattress laws.

There were 2 cases for obstructing an inspector, one case resulting in conviction, the other in a finding of not guilty.

A complete report of these cases will be found in Table 1.

There were examined 5,065 samples of milk, of which 4,812 were collected by the inspectors. Of these samples, 73 showed evidence of removal of a portion of the cream and 48 showed the presence of added water. The watered samples represented 0.94 per cent of the total samples collected, and is the lowest figure on record since our tests for added water were developed some twenty years ago. There were 1,095 samples below the legal standard. This figure would naturally appear to be high except for the fact that fully 25 per cent of the samples are obtained from sources where we suspect there may be some adulteration. For example: If the milk sold by a milk dealer is above but fairly close to the standard, an investigation of his producers is made for the purpose of ascertaining whether or not any of them are selling adulterated milk. It is to be expected that a large number of these producers are selling low standard milk to the milk dealer, but a still larger number are selling high standard milk and the mixture which the milk dealer puts out will be standard. A summary compiled from the samples obtained only through retail milk dealers indicates a very high quality of milk sold by such dealers. Fifty per cent of the samples collected during the year showed total solids between 12.1 per cent and 12.8 per cent; 25 per cent of the samples had solids above the highest figure, and 25 per cent had solids below the lowest figure; 84 per cent of the samples had total solids between 11.4 per cent and 13 per cent. The average of the 4,812 samples collected by the inspectors was 12.40 per cent solids, 3.76 per cent fat, and 8.64 per cent solids not fat. The average of the 4,703 samples found not to be adulterated was 12.45 per cent solids, 3.80 per cent fat, and 8.65 per cent solids not fat. In view of the fact that our standard calls for milk with solids of 12 per cent and fat of 3.35 per cent, it is very evident that the people of Massachusetts are being furnished with a relatively high quality of market milk. A summary of these milk statistics will be found in Tables 2 and 3.

In addition to chemical examinations of milk, the Division has made a number of bacteriological examinations. We have paid the most attention to the bacteriological quality of the milk delivered to pasteurization plants to be pasteurized, and these figures show lower counts than one would expect, and, furthermore, in comparison with samples obtained last year, show much lower figures. A systematic examination of this type of milk was begun in July, 1930, and the geometric mean of the samples collected from July, 1931, to the close of the fiscal year showed a lower figure than those collected during the prior year. There were 3,041 samples of such milk examined. A count of 10,000 or less was shown in 10.3 per cent, this being the count specified for certified milk; 64.1 per cent of the samples showed a count of 100,000 or less; 74.3 per cent of the samples showed a count of 250,000 or less, which is the standard for Grade A milk; 90.6 per cent showed a count below 750,000, which is the maximum figure set by the Department for milk to be pasteurized; 96 per cent of the samples showed a count below 1,500,000, which is the figure suggested by the Commissioner of Agriculture at the time the regulations relating to pasteurization were under consideration; 0.5 per cent of the samples showed a count above 2,500,000, and 0.07 per cent of the samples showed a count above 10,000,000. The lowest count was 300. The highest count was 22,000,000. The geometric mean of these figures was 83,027.

Much of this improvement is due to the activities of the men engaged in the business of pasteurizing milk. When such persons who are interested in the welfare of the product they are selling find that they are obtaining milk with high counts, they take means to induce the producer to furnish milk with a low count, and invariably those means are successful. Some milk dealers pay a premium for low count milk, and the producers are therefore careful in the handling and cooling of the product which they are selling.

The high count milk is not always the long distance milk. It sometimes happens that the dairy located within five hundred feet of the pasteurization plant is responsible for this high count. It also happens that long distance milk may have a high count. Some of the lowest counts have come from long distance milk, and other low count milk has been received from dairies located near the pasteurization



establishment. It seems, however, that the producer living at a long distance and knowing that if the count is high he is liable to lose his market, will take particular pains to handle the milk in a clean manner in clean utensils and keep it cold.

Of the certified milk examined, only one of the 65 samples showed a count above 10,000; 1 count was 15,000.

There were very few samples of raw milk sold as such collected, — only 60 samples in all, and these figures do not give a representative idea as to the market condition of such milk. The milk, however, was unusually good.

There were 499 samples of pasteurized milk collected, including 87 samples of Grade A milk, and 23 samples of pasteurized certified milk. The lowest count was less than 100. The geometric mean was 14,502. There were 129 samples above 50,000.

It is the custom when inspections of pasteurization plants are made and the inspector is in the plant when the milk is being bottled, to obtain, if possible, the first bottle which comes off the bottle filler. The purpose of this is to ascertain the cleanliness of the pipe line, the cooler, and the filler. If these are not sterile or nearly so, the milk will take up the bacteria, and the first bottle will show a high count. It is also the custom to collect another bottle after a dozen cases or so have been filled in order to give information as to the efficiency of the pasteurization process. This second sample is invariably low. Our figures for pasteurized milk, therefore, show a higher count than if all the samples were collected from milk wagons at the time of delivery. It is very satisfactory to note that 88.4 per cent of the total samples collected complied with the bacteriological regulations. A summary of these examinations will be found in Table 4.

#### HEMOLYTIC BACTERIA IN MILK

During the latter part of April, a complaint was received from the Board of Health of Revere regarding the alleged presence of hemolytic bacteria in pasteurized milk sold in that city. A few days later, milk was collected in Revere and it was found that three dealers were selling pasteurized milk containing hemolytic bacteria, the balance of the dealers selling milk which did not contain this type of bacteria.

The pasteurization establishments of these three dealers were carefully inspected in order to ascertain what, if anything, was wrong with the process. Several inspections were made in the plant of one dealer and we were unable to detect anything wrong with the process, although we found that the hemolytic bacteria were apparently not killed by the pasteurization process.

In another plant we found distinctly unsanitary conditions and after a thorough cleaning we were unable to find hemolytic bacteria in the pasteurized milk. It so happened in this particular test that there were no hemolytic bacteria in the raw milk from which the pasteurized milk was prepared.

The third plant was found to be violating the pasteurizing laws extensively and a prosecution was directed. One count was for capping milk bottles by hand; another count was for falsely dating Grade A milk; a third count was for selling Grade A milk below the 4 per cent fat standard. There was a finding of not guilty in the case involving false dating. The other two cases resulted in conviction and the imposition of a substantial fine, which was paid.

This investigation was extended to several other cities and towns in the State. As a result, we found 24 samples of pasteurized milk showing the presence of these hemolytic bacteria, the samples being obtained from 5 different dealers. We found 80 samples of pasteurized milk not containing these hemolytic bacteria, the samples being obtained from 34 different dealers.

We investigated several pasteurization plants, obtaining samples of the milk prior to pasteurization and samples of the same milk subsequent to pasteurization. In two instances only did we find the hemolytic bacteria to survive the process of pasteurization. Twenty-eight samples of milk obtained prior to pasteurization were found to contain the hemolytic bacteria and 34 similar samples were found not to contain the hemolytic bacteria.

Of the raw milk intended to be pasteurized, we found that invariably the milk for Grade A purposes did not contain the hemolytic bacteria, whereas the milk from the same pasteurization establishment for ordinary market milk was found to

contain the hemolytic bacteria. It is probable that the farmers furnishing milk for Grade A purposes are particular not to ship any milk to market if the cows show any symptoms of udder trouble, whereas the same precaution is not taken with the ordinary market milk. One reason for this is the increased payment given to producers for low count milk in the case of Grade A milk and the producer having knowledge that such milk is frequently examined by the receiver.

A summary of the examinations before and after pasteurization showed that three dealers pasteurized milk containing hemolytic bacteria and these same bacteria were found in the finished product. Three other dealers pasteurized milk containing hemolytic bacteria and no bacteria of that type were found in the finished product. Three dealers pasteurized milk with no hemolytic bacteria and naturally no hemolytic bacteria were found in the finished product.

Experiments on the cultures obtained from samples examined in this Department showed that the hemolytic bacteria should have been killed at the pasteurizing temperature. A transfer from a few colonies of these bacteria was used to seed some milk sterilized in the laboratory. This milk so seeded was given sufficient time for the bacteria to grow and a sample was heated to 140° and portions removed every five minutes during this period. It was found that the unheated sample showed the presence of the hemolytic bacteria but that there were no such bacteria in the sample heated to 140° for five minutes. This result does not conform with the verbal reports presented by the experts of two of the milk companies, each of such experts stating that he carried out similar experiments and found that the hemolytic bacteria were not killed at 145° in thirty minutes. In view of the fact that this type of bacteria is so prevalent in the raw milk sent to the pasteurizing plants and so little of the pasteurized milk contains these bacteria, we are forced to the conclusion that this particular type of bacteria must certainly be killed under ordinary pasteurizing conditions and that something which we could not discover was wrong in the operation of the pasteurization process in these three instances.

This particular hemolytic bacteria was undoubtedly nonpathogenic, otherwise there would have been tremendous epidemics in Revere and elsewhere.

#### CERTIFIED MILK

Certified milk for sale in Massachusetts is produced on the following farms: Bonnie Brook Farm in Sudbury, Cherry Hill Farm in Beverly, Hood Farm in Derry, N. H., all controlled by H. P. Hood and Sons' Company; Hampshire Hills Farms in Wilton, N. H., controlled by Whiting Company; Walker Gordon Farm in Needham; Alta Crest Farm in Spencer; Quonquont Farm in Whately owned by Frederick U. Wells; and the Fillmore Farm in Bennington, Vermont. The first six of these farms are certified by the Boston Medical Milk Commission. The Alta Crest Farm is also certified by the Medical Milk Commissions of Worcester, Springfield, and Providence, R. I. The Quonquont Farm is certified by the Medical Milk Commission of Springfield, and the Fillmore Farm is certified by the Medical Milk Commission of Pittsfield. The Fillmore Farm produces large quantities of certified milk, which is sold mostly in New York State, but a small quantity is sold in Pittsfield. Recently, the Hood Company decided to produce no more certified milk at the Bonnie Brook Farm. At present there are only seven farms producing certified milk for sale in Massachusetts.

Since the passage of the law giving this Department some control over contracts between Medical Milk Commissions and milk producers, eleven farms have ceased to produce certified milk. Seven of these ceased to produce such milk because of action of this Department either directly or indirectly through the Commissions. The buildings of one farm burned and were not replaced and three farms ceased producing certified milk voluntarily and are now furnishing other than certified milk. During this same period six Medical Milk Commissions either have dissolved or are inactive. All the certified milk sold in the State now is produced on a large scale.

It is interesting to note the increase of pasteurization of milk produced under certified conditions. Two of these farms are pasteurizing certified milk and selling it as such. Two farms are pasteurizing certified milk and selling it either as pasteurized milk or as Grade A milk. One of the farms is mixing the surplus certified milk with other milk; is pasteurizing the mixture; and selling it as Grade A milk.



The Boston Medical Milk Commission each month submits to the Department a sample of milk from each of the dairies certified by the Commission. The samples are submitted for chemical examination but bacteriological examinations are also made. It is to be regretted that the distance interferes with similar activities on the part of the Worcester, Springfield, and Pittsfield Commissions. The fat is required by regulation to average 4 per cent, and of the 71 samples examined the average fat was found to be 4.19 per cent. The following table gives the highest, lowest, and average fat of each farm, together with the average bacteria count. It should be noted that only one farm showed an average below 4 per cent fat.

Farm	Highest Fat Per Cent	Lowest Fat Per Cent	Average Fat Per Cent	Average Bacteria Count
A . . . . .	4.65	4.30	4.45	2473
B . . . . .	4.75	4.05	4.38	2089
C . . . . .	4.30	3.70	4.16	2673
D . . . . .	4.55	3.65	4.15	3645
E . . . . .	4.95	3.55	4.09	2619
F . . . . .	4.20	3.70	3.95	2113

Two samples of milk obtained from one of the farms not certified by Boston were found to be below the legal standard for solids, but the bacteria count was low, being 2,500 in one and 2,400 in the other. The 65 samples examined for bacteria were found to vary as follows: Five samples below 1,000; nineteen samples with counts between 1,000 and 2,000; thirty-two samples with counts between 2,000 and 4,000; eight samples between 4,000 and 9,400; and one sample with a count of 15,000. The geometric mean of these figures was 2,114, which was only slightly below the arithmetic average of 2,617, — unusually small variance.

It was necessary to suspend the contract of one farm, due to gross violations of the regulations, such as a sick cow in the milking line; non-use of strip cups; hands of the milkers not properly washed prior to milking each cow; water shut off, and same water used for all washings; milkers' suits stored under improper conditions; toilet facilities not in conformance with regulations; and a few other violations. Three days after revocation notice was sent, a reinspection was made and conditions were satisfactory. About two months afterwards another inspection was made and conditions were still satisfactory.

Another farm was found to have a cow with a bad udder in the milking line. The inspector was not present during milking but the herdsman said that the cow was all right in the morning. The accuracy of this statement is questioned by the veterinarian who examined the cow. The milk was poured, in the barn, into pails behind the cows. The pails were not entirely protected and there were plenty of flies crawling on the outside and some on the inside of the pails. The milk was misbranded as to the day on which it was milked. One bottle of certified milk was labeled "Extra Heavy Certified Milk, A Blended Milk from Our Guernsey and Jersey Herd." The investigation of the premises showed that there were no Guernsey or Jersey cows there but the herdsman tried to claim that the presence of two or three cross-bred cows with some Jersey or Guernsey blood in them justified the label. The fat percentage, however, did not justify the label. This farm was also misbranding Grade A milk as to the day of pasteurization. It was selling skimmed milk without causing the milk to be labeled as required by law and was mixing raw milk with pasteurized milk and labeling the milk "Pasteurized." For these last two violations the owner was prosecuted and convicted.

Notwithstanding the enlargement of some of the Certified Farms, it is very evident that the trend is going away from certified milk and is going toward pasteurized milk produced under certified conditions. This is shown by the installation of pasteurizing equipment on most of the certified farms during the past two or three years.

#### GRADE A MILK

It was found that as a rule Grade A milk conformed both with the fat standard and with the bacteriological standard. Quite a number of persons selling Grade A milk were not having bacteriological counts made of the raw milk which they were

using for Grade A purposes. One operator of a certified farm was pasteurizing milk which was sold as Grade A milk. The raw milk which he pasteurized had counts of 600, 1,400, and 14,000. His product after being bottled had counts of 35,000, 150,000, and 170,000. The second set of samples, obtained about two weeks later, showed counts in the Grade A milk of 9,200, 11,000, and 15,000. Another person was showing somewhat high counts on the Grade A milk. Investigation showed that the fault was in the handling after pasteurization.

One farm had a very fine herd of cows on the premises and was also advertising Grade A Milk. The customer would naturally assume that the milk was produced upon the premises. The farm was located within twelve miles of Boston, but the Grade A milk came from Northern Vermont, and the count was low. Upon inquiring as to why the person did not use the milk produced on the farm, which was of exceptionally fine quality, and the farm was run under exceptionally good sanitary conditions, we were informed that there was insufficient milk produced to furnish the demand for the Grade A product.

The few instances we have found where Grade A milk is being sold with a fat content less than 4 per cent, are probably due to a telephone call for a few extra quarts of Grade A milk. Many persons handling this product do not put up a surplus, and consequently when such a call comes, it takes considerable moral courage to state that there is no more Grade A Milk; instead, the dealer will undoubtedly take the cap off a bottle of ordinary market milk and substitute the "Grade A" cap and thereby satisfy the customer. This is the only way that the occasional low fat samples of Grade A milk can be accounted for.

In one instance the inspectors were in a pasteurization establishment and saw a case of half pint bottles of ordinary milk taken out of the ice box; the caps removed; "Grade A" caps placed on the bottles; and the bottles returned to the ice chest. The inspectors then obtained samples of this milk; talked with the manager about it; and the story was that a call had come from a restaurant for a case of half pint bottles of Grade A milk and the Grade A milk for that day was all put up and they were unable to furnish the half pint bottles otherwise. After the manager had ascertained what the inspectors had found out, he would not sell that particular milk. Nevertheless, he was convicted and fined for having such milk in his possession with intent to sell it.

Notwithstanding these occasional cases of violation, it can be truthfully stated that the Grade A milk sold on the Massachusetts market is a milk of very superior quality.

### PASTEURIZATION PLANTS

There are slightly more than 700 plants in the State. Notwithstanding the fact that each board of health is required to send the department a copy of each application for a license bearing a statement of the action of the board thereon, we occasionally discover pasteurization plants of which we have no record. One such plant, in operation for two years, was recently discovered as the result of collecting a sample of milk in the early morning in a small town.

The inspectors have inspected 682 plants during the past year, of which 110 were inspected twice; 36 were inspected three times; and 11 were inspected four times; making a total of 839 inspections. These figures do not include visits to pasteurization establishments for the exclusive purpose of collecting samples of milk for examination.

Each plant is required to be licensed by the board of health of the town where the plant is located and the owner is required to post this license upon the premises. There were 14 plants operating without licenses and the licenses of 46 plants either could not be found or were not posted.

The regulations for the operation of these plants are made by this department, and they specify certain basic principles regarding construction and drainage. Thirty-six plants were found to be more or less deficient as to construction and ten plants were found to be deficient as to drainage. The premises of 49 plants were found to be more or less unsanitary and the equipment, such as vats, pipe lines, coolers, and bottle fillers, were found to be more or less dirty in 111 plants. All but 18 plants were found to have proper means of sterilizing milk bottles. The regulations require all plants to have an accurate mercury thermometer and a



recording thermometer connected with the pasteurizing equipment. The plant owner is required to compare the readings of the two thermometers each day at the pasteurization temperature and to write this data upon the chart of the recording thermometer. It is necessary to place on the recording thermometer each day a correctly dated chart. This procedure gives the plant owner an accurate record of the temperature of the pasteurization of each batch, and if the records are kept they are made available for his protection if any claim of sickness due to incorrect pasteurization is brought against him. This record is also available for the use of the inspector to ascertain whether or not the pasteurization is performed as required by statute.

It was found that the recording thermometer charts of 2 plants had been destroyed; those of 21 plants were not dated; and those of 97 plants did not bear the correct reading of the two thermometers.

One particularly unsanitary and possibly dangerous practice is the capping of milk bottles by hand. One septic sore throat epidemic is believed to have been caused by this practice. This epidemic occurred upon a raw milk route, but if the milk had been pasteurized and the bottles subsequently capped by hand by the same person, no doubt the epidemic would have occurred just the same. In 23 plants this regulation was violated and there have been many prosecutions. Plants are required to have leak escape valves connected with the pasteurizing vats. These valves are so constructed that if there is a leak, when the valve is closed the material leaking by the valve will come through the by-pass and will leak upon the floor and will not come into the vat or into the pipe line through which the pasteurized milk will flow. If the vats are not equipped with such valves, it is required that the piping be disconnected from the valves during the pasteurizing period. This prevents raw milk from entering the vat during the pasteurizing period and also prevents incompletely pasteurized milk from escaping into the outlet lines.

All but 48 of the plants in the State are equipped with leak escape valves and these 48 plants claim to disconnect the piping as required by the regulations. An occasional violation of this usually results in a prosecution. In 5 plants where leak escape valves were installed, the leak escape feature had been plugged by somebody connected with the plant. Prosecutions have resulted in most of these instances. In one instance it was ascertained that the repair man of the dairy supply house was responsible for blocking the leak escape valve.

Pasteurization is defined by statute as heating the milk to a temperature of not less than 140°F., nor more than 145°F. for a period of not less than thirty minutes. In 58 instances there was evidence either of low temperature or short time or both. This evidence was sometimes obtained from the recording thermometer charts and sometimes obtained by the arrival of the inspector at the plant at the right time. Whenever the evidence was obtained from the thermometer chart, the proprietor of the plant was given an opportunity to explain why the chart did not show apparently correct pasteurization. In a few instances he has been able to explain this in a satisfactory manner, and then he has been informed what to do in order that subsequent charts would show correct pasteurization.

In one instance an inspector came into a plant twenty minutes after the mixture in the pasteurizing vat had reached the pasteurizing temperature and he found that a number of cases of milk had been bottled and had been capped with caps bearing the word "Pasteurized." The owner pleaded guilty in the Salem Court and was fined \$100 and appealed. The District Attorney thought that this violation of law was of sufficient importance to nol pros the case, which he did.

The penalties for violation of the pasteurization laws have ranged from \$5 to \$100 in each case. The courts as a rule have seen the importance of having pasteurization performed properly and have been imposing rather severe fines, more so than in some other violations of the Food and Drug Laws.

#### SUMMARY OF EXAMINATION OF FOODS OTHER THAN MILK

There were in all 2,104 samples collected and examined, of which 409 were found to be either adulterated or misbranded, and 1,695 samples were found to conform with the requirements of the law. There were 57 samples of butter examined,



of which 22 were declared to be adulterated. Represented in these samples were 11 samples of oleomargarine and 2 samples found not to be oleomargarine, submitted by the Department of Agriculture. The balance of the samples were examined for fat. The most of these samples were collected during the latter part of the year, and investigations regarding these are still in progress. It was found that the Western creameries were shipping in butter of a fairly low fat content, the average fat being 80.36 per cent, which is only slightly above the standard of 80 per cent; 1 sample had a fat content as low as 77.3 per cent; 7 samples had fat contents between 78.3 per cent and 78.9 per cent; and 4 samples had fat contents between 79.0 per cent and 79.8 per cent. Many of these samples were shown to have fairly high moisture content. In taking up this matter with the representative of one of the Western creameries, it was found that it was the custom in the creameries to determine the moisture and salt, to estimate the curd, and to get the fat by difference, allowing 0.5 per cent for errors and variation in sampling. Many of these samples were obtained from wholesale houses. Samples obtained from retail stores showed a higher average fat content than did those obtained from the wholesaler. This is, of course, due to evaporation of moisture from the tub after it was opened. The process of cutting the butter also has a tendency to squeeze some moisture out of it. The loss here was borne by the storekeeper and was not borne by the creamery where it properly belonged.

Forty-seven samples of cream were obtained of which 5 were not found to be labeled as required by statute. These 5 samples were obtained from persons who did not label the cream as specific grade, or labeled it with the word "Ungraded" and neglected to specify the fat content. The cream labeled as to grade was found in all instances to conform with the requirements; 25 samples of heavy cream were found to vary in fat between 34.5 per cent and 45 per cent, with an average of 38.7 per cent. In view of the fact that the standard for heavy cream is 34 per cent, and the standard for extra heavy cream is 38 per cent, it is very evident that there can be no complaint made of the quality of cream put on the market by the Massachusetts milk dealers. The extra heavy cream was found to vary between 39 per cent and 43 per cent.

#### CLAMS

There were 58 samples examined, and 28 samples were found to contain added water. It is the practice in the shellfish industry to wash clams after being taken from the shell. The reason given for this is to get them clean, but a study of the sanitation of the establishment indicates no very great desire to operate the place under excessively high sanitary conditions. The actual reason is to increase the volume of the clam, as the clam will absorb fresh water in a very short time.

The dealers also state that this practice is necessary to keep the clams from souring or going bad, and they also state that it always has been done. Many times the operator of a shucking establishment has been asked at hearing why would it not improve a beef steak to treat it in the same manner, and the invariable reply is that such talk is pure foolishness. Nevertheless, if a piece of meat were soaked in water, it would absorb water in the same manner that shellfish will absorb water.

It was decided late in the year to carry on a series of experiments relative to clam washing and clam soaking for different lengths of time for the purpose of finding, if possible, an effective method of washing clams which would not permit them to take on an excessive quantity of water. Soaking of clams results in the absorption of from 20 per cent to 25 per cent of water, and a clam soaker can therefore get five gallons of soaked clams, whereas if they were not soaked he would have but four gallons.

For the experiments, clams in the shell were obtained as soon as possible after digging; were shucked; and divided into portions which were treated differently. Each lot was kept under uniform conditions after treatment. Three different lots were obtained, — one on June 11, 1931, from a dealer in Salisbury Beach, and two on June 22, 1931, from a Boston dealer. Immediately after shucking, a quantity from each lot was taken and different portions treated as follows:

- (a) One quart was left unwashed, just as taken from the shell. The remaining portion was washed in the ordinary commercial method, either by dipping

or with the hose for 30–35 seconds, and taken to the laboratory, iced. Of this —

(b) One quart was set aside after this commercial washing.

(c) One quart was soaked in water for five minutes.

(d) One quart was allowed to soak in excess 3 per cent NaCl for an indefinite period.

(e) One quart was allowed to soak in excess of water for an indefinite period.

A 3 per cent salt solution was used for the reason that such a solution corresponded approximately in chlorine content to that found in the shell liquor of clams. Samples of liquor from lots 2 and 3 were examined for chlorine content, with results as follows: —

Liquor from lot No. 2 (Essex clams) — 1.64 per cent Cl. — 2.69 per cent NaCl.

Liquor from lot No. 3 (Nova Scotia clams) — 2.02 per cent Cl. — 3.31 per cent NaCl.

Determination of total solids was made on each sample twenty-four hours after preparation. Determinations of per cent total nitrogen, milligrams of ammonia per 100 grams, and the ratio of the ammonia to the total nitrogen were made at regular intervals. The acidity of certain of the samples was determined after forty-eight hours.

The clams were kept in an ice box under uniform conditions, being taken out only for removal of a portion for analysis. This portion was prepared for analysis as follows:

The entire sample was mixed and a portion taken out, placed in a sieve and allowed to drain with shaking for 30 seconds. That portion was then passed through a meat chopper and finely ground. The entire ground portion was then mixed thoroughly each time previous to weighing out a sample for analysis. New portions were prepared in this manner for each day's analysis.

The total solids were determined by evaporation of a weighed portion to dryness in a platinum dish on steam bath.

The total nitrogen was determined by the Kjeldahl Gunning Method, a 1.5 g. to 2.5 g. sample being used.

The ammonia was determined by the Folin aeration method, on a 10 g. sample.

The acidity was determined by titration with  $n/10$  alkali of a 10 g. sample mixed with distilled water, using phenolphthalein.

Soluble solids and soluble proteins were also determined on the samples of Lot No. 1 by placing a 20 g. sample in 100 cc. volumetric flask, making up to volume, shaking thoroughly, allowing to stand in refrigerator over night, filtering and taking 25 cc. aliquots for solids and nitrogen determinations. The soluble nitrogen figure  $\times 6.25$  gives soluble protein.

#### *Total Solids*

Lot No. 1	Lot No. 2	Lot No. 3	Average
(a) 19.85	(a) 22.08	(a) 22.73	21.55
(b) 18.61	(b) 19.79	(b) 20.65	19.68
(c) 16.53	(c) 18.13	(c) 19.75	18.17
(d) 16.95	(d) 19.52	(d) 20.49	18.98
(e) 12.23	(e) 14.70	(e) 15.32	14.08

The total solids of the freshly shucked unwashed clams varied from 19.85 per cent to 22.73 per cent, with an average of 21.55 per cent (a). Washed by the ordinary commercial method, the average was brought down to 19.68 per cent (b). A five minute soaking lowered the total solids to 18.17 per cent (c). Soaking in water produced an average of 14.08 per cent (e) total solids. Soaking in 3 per cent NaCl for an indefinite period reduced the solids to 18.98 per cent (d). It is therefore possible to wash shucked clams even for an extended period in 3 per cent salt solution without considerable loss in total solids. The appearance of these clams was good at the end of 24 hours standing in the solution, and they were not perceptibly swollen. Those soaked in water for a similar length of time were greatly swollen. It follows that a thorough washing with the salt solution for five or ten minutes would probably clean the clams satisfactorily without appreciable loss in total solids. The ordinary commercial method of washing with plain water, if done for only a half

minute or so, seems to be preferable to any other method from the viewpoint of loss of substance of the clam, although it is claimed by the dealer that such a washing is insufficient.

It seems to be true that those clams with high salt content sour more quickly, a fact also claimed by the dealers. The results of acidity determination on three samples from each of Lots No. 2 and No. 3 indicate this.

*Acidity after 48 hours of 10 g. sample*

Lot No. 2	Lot No. 3
cc. N/10 alkali	cc. N/10 alkali
(a) 3.3	(a) 4.9
(b) 4.2	(b) 4.8
(d) 5.3	(d) 9.3

The reason for this has not been determined. On the other hand, the salt solution exercises a preservative effect on the protein matter of the clam, arresting ammoniacal decomposition. The results of the determinations for total nitrogen, ammonia, and extent of decomposition as expressed by the ratio of ammonia to total nitrogen are as follows:

TOTAL NITROGEN AND AMMONIA

(a) *On unwashed sample*

	After	Lot No. 1			Lot No. 2			Lot No. 3		
		N	NH <sub>3</sub>	NH <sub>3</sub> /N	N	NH <sub>3</sub>	NH <sub>3</sub> /N	N	NH <sub>3</sub>	NH <sub>3</sub> /N
24 hours	.	-2.10	3.81	.18	2.43	6.28	.258	2.69	6.45	.239
48 "	.				2.36	11.5	.487	2.52	14.1	.559
72 "	.				2.22	10.34	.465	2.54	10.81	.425
96 "	.	2.22	21.42	.96	2.15	21.8	1.014	2.53	26.6	1.054

(b) *On sample washed commercially*

	After	Lot No. 1			Lot No. 2			Lot No. 3		
		N	NH <sub>3</sub>	NH <sub>3</sub> /N	N	NH <sub>3</sub>	NH <sub>3</sub> /N	N	NH <sub>3</sub>	NH <sub>3</sub> /N
24 hrs.	.	-2.10	5.28	.25	2.17	7.64	.352	2.36	8.75	.370
48 "	.				2.19	12.6	.575	2.41	16.9	.701
72 "	.				2.06	12.0	.572	1.87	12.50	.668
96 "	.	2.10	19.20	.91	2.14	21.8	1.019	2.35	23.7	1.011

(c) *On sample washed for five minutes*

	After	Lot No. 1			Lot No. 2			Lot No. 3		
		N	NH <sub>3</sub>	NH <sub>3</sub> /N	N	NH <sub>3</sub>	NH <sub>3</sub> /N	N	NH <sub>3</sub>	NH <sub>3</sub> /N
24 hrs.	.	1.82	6.15	.34	1.94	7.69	.396	2.29	6.12	.267
48 "	.				2.09	11.9	.569	2.25	13.9	.617
72 "	.				1.86	9.91	.532	2.18	11.71	.537
96 "	.	1.73	16.98	.97	2.04	18.3	.898	2.27	22.4	.987

(d) *On sample soaked in 3 per cent NaCl*

	After	Lot No. 1			Lot No. 2			Lot No. 3		
		N	NH <sub>3</sub>	NH <sub>3</sub> /N	N	NH <sub>3</sub>	NH <sub>3</sub> /N	N	NH <sub>3</sub>	NH <sub>3</sub> /N
24 hrs.	.	2.05	3.60	.18	2.15	4.56	.212	2.37	5.08	.214
48 "	.				2.02	8.9	.441	2.26	11.2	.495
72 "	.				2.09	11.21	.536	2.07	11.88	.574
96 "	.	1.94	14.63	.75	2.02	18.17	.899	1.87	24.4	1.309

(e) *On sample soaked in water*

	After	Lot No. 1			Lot No. 2			Lot No. 3		
		N	NH <sub>3</sub>	NH <sub>3</sub> /N	N	NH <sub>3</sub>	NH <sub>3</sub> /N	N	NH <sub>3</sub>	NH <sub>3</sub> /N
24 hrs.	.	1.39	3.98	.29	1.67	6.12	.366	1.72	5.02	.291
48 "	.				1.71	8.1	.474	1.76	10.3	.585
72 "	.				1.36	10.9	.801	1.83	16.00	.874
96 "	.	1.39	7.29	.52	1.68	12.6	.751	1.86	21.2	1.141

Compared with the other washed samples, the sample treated with 3 per cent NaCl remained the longest in a condition fit for food, under the conditions of keeping. The salt exercised a preservative influence on the protein matter of the clam. At the end of 48 hours the ratio of ammonia formed through decomposition to



total nitrogen in the NaCl treated sample of Lot No. 2 was .441 per cent, as compared with .575 per cent, .569 per cent, and .474 per cent in the other washed samples in Lot No. 2. In Lot No. 3 the sample washed with NaCl after 48 hours had a ratio of .495 per cent as compared with .701 per cent, .617 per cent, and .585 per cent in the other washed samples of Lot No. 3; the extent of decomposition represented by a ratio of .500 per cent is the upper limit consistent with edibility. In each lot the sample washed for 30-35 seconds showed the most rapid decomposition of all the washed samples, and that soaked for 5 minutes the next most rapid. The samples soaked in water indefinitely were also more decomposed after 48 hours than the samples soaked in 3 per cent NaCl.

*Soluble Solids and Soluble Proteins  
Lot No. 1 at end of 24 hours*

	Soluble Solids	Soluble Proteins
(a)	8.91	5.36
(b)	9.26	5.75
(c)	7.48	4.73
(d)	8.11	4.82
(e)	5.39	3.34

The increase in per cent soluble solids and soluble proteins in (b) over (a) is due to the fact that (a) (the unwashed sample) contained more or less sand, bits of broken shell, etc., which were removed by the washing received by (b).

*Comment*

Clams in the shell contain approximately 21.5 per cent total solids and shucked clams should have a similar figure in total solids content. If they do not it is because they have been watered either by willful soaking or through prolonged washings. Soaking in, or prolonged washing with, water not only dilutes the substance of the clams, causing them to become swollen through absorption of water, but also washes a part of it away so that it is lost. Clams contain carbohydrates and protein which are subject to the action of microorganisms which bring about changes and eventually render the clams unfit for food. The salt content of the clam has been claimed to exercise an influence over the rate of souring, the higher the salt, the more quickly the clams become sour. These experiments indicate that this is probably true, but the extent of souring as measured by the acidity developed appeared insignificant so long as the clams were not otherwise decomposed beyond edibility. The experiments showed that a salt solution did preserve the clams and decrease the rate of ammoniacal decomposition and that it also kept the total solids at a reasonable figure and prevented swelling of the clams. If the purpose of washing was to clean the clams a 3 per cent salt solution would serve well, for it would both clean and preserve.

*Conclusion*

It is possible to wash shucked clams commercially with a 3 per cent salt solution and still maintain the required amount of total solids, so that there is no adulteration by the addition of water. Clams washed with water for an extended time become adulterated with added water and their food value decreased. The 3 per cent salt solution not only prevents this but preserves the clams as well.

This work was carried on under the direction of Mr. Ferguson.

*Eggs*

There were 694 samples examined and 188 samples were found to be either adulterated or misbranded or falsely advertised. The result of this work is shown in the prosecution table.

*MAYONNAISE*

There were 9 samples examined. One was found to have been made with mineral oil, and the person putting it out was informed that mineral oil, not being a food, would be considered as an adulteration unless the material were sold as a drug.

## MEAT PRODUCTS

The bulk of the meat products examined were sausages and Hamburg steak, both of which have been discussed in the summary of the prosecutions. An investigation is being carried on relative to the chemical effects of sodium sulphite on ground meat. Our experiments show that within certain limits the article acts as a preservative. There is also some reaction between the sulphite and the amino acids of the meat. This work was started with the intention of asking the Legislature to pass a law prohibiting the use of these articles in meat products. The work, however, has not been completed, and it was deemed advisable to wait another year before making such a request.

Five samples of canned meats were found to be in a badly decomposed condition. These were some meat in storage, and the goods were confiscated. One sample of liver, one sample of pork, one sample of soup stock were found to be decomposed. There were 15 samples of foods classed as miscellaneous, the bulk of which were submitted as the alleged cause of sickness. In no instance were we able to connect this material with the real cause of the sickness. Many of these cases of sickness were due to carbon monoxide, as was subsequently found.

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There were 36 samples of metal polish obtained from various hotels and restaurants throughout the State. They were examined for the presence of potassium cyanide, with negative results. A few years ago, when it was shown that the use of cyanide as a cleaner of silver or metals was liable to cause sickness, the hotel and restaurant associations agreed to stop the use of such material for such purposes. Annual investigations have shown that they have complied with their agreement.

A summary of the analyses of food samples is shown in Table 5.

## DRUGS

There were examined 401 samples of drugs, of which 128 were submitted by the inspectors. Included in these are 26 samples of denatured alcohol which were purchased in ascertaining whether or not wood alcohol was being sold as denatured alcohol and whether or not the vendor of such article had a license from the board of health. There were 38 samples of ether examined, of which 19 were found to contain traces of aldehydes. The amounts of divergence from the requirements of the pharmacopœia were too slight to warrant prosecution, and subsequent collections were found to be free from aldehydes. One sample of magnesium citrate solution was found to be low in magnesium. There were 269 samples of sweet spirit of nitre obtained, of which 90 were found to be below the pharmacopœia requirements. There were 28 samples of argyrol solution purchased of which 15 were found not to conform with the quality of strength and purity stated upon the label. Argyrol is an organic salt of silver and is used as an antiseptic and is frequently prescribed by physicians. There are several of these silver compounds on the market, sold under different names, such as Silver Nucleinate, Silver Proteinate, etc. These different articles are substantially the same in their therapeutic value, but argyrol is the most expensive one. The inspector would ask for two ounces of 15 per cent argyrol, and would take what was sold to him. He would then inquire as to what was being used in making the preparation and it was found that the druggist in many instances did not dispense argyrol but used one of the cheaper substitutes, although he labeled the bottle he sold "15 per cent Argyrol." We found that about 68 per cent of the druggists dispensed an article of the strength called for; 19 per cent of the druggists dispensed an article about three-quarters strength; and 13 per cent dispensed an article about half strength. The druggists who substituted other articles for the argyrol thought that it was not at all improper to do so because the substituted article was the same as far as its medicinal properties were concerned. The principal excuse for putting out low strength solutions was that there was a slight error in computation. One man dispensed a 10 per cent solution and labeled it "15 per cent" and was in the store when the sale was made. At the hearing he stated that this was unintentional and it was probably carelessness in dilution as he had a 20 per cent stock solution which was

made the day before by a registered pharmacist. Incidentally, he said that argyrol cost \$1.50 an ounce, and therefore the cost of two ounces of 10 per cent solution which he sold would be thirty cents. He charged the inspector \$1.00 for this and labeled the preparation "15 per cent." He paid a substantial fine in court.

After the drug trade had ascertained that the department was collecting argyrol solution, it was astonishing how many druggists were unable to fill the order when the inspector came into the store.

The Police Departments of 101 cities and towns, and the Department of Public Safety submitted 6,012 samples of liquor. Of these 3,272 samples were distilled spirits; 1,587 were beer; 629 were alcohol; 346 were wine; 52 were cider; 49 were flavoring extracts; and there were 77 miscellaneous samples which could not be otherwise classified.

A summary of the liquor analyses is found in Table 6.

The Police Departments submitted 90 samples of drugs, chemicals, and poisons. A summary of the examination of these samples is found in Table 7.

### BAKERIES

Lifting bakeries from a very unsatisfactory to a reasonably satisfactory plane is one of the accomplishments of the Division through the medium of the bakery and sanitary food laws. Prior to the enactment of the general bakery law in 1920, there existed some legislation giving the boards of health the right to make certain regulations regarding these food establishments, but the legislation was not particularly satisfactory and naturally the regulations were far from uniform in the different cities and towns. Because of this, the baking industry saw the desirability of placing upon the statute books a law wider in scope and authority and this was done through the instrumentality of the baking industry. The new law was naturally warmly received by the bakers who operated their establishments on a clean basis and desired their competitors to do likewise. This element, although large in quantity of production, was in the vast minority numerically.

The new bakery law and regulations met a long-felt want in that they made specific demands, uniform throughout the State, for clean methods and equipment for the production of food and provided a penalty for maintaining an unclean establishment. The law provided for enforcement by the State Department of Public Health and by the local boards of health acting under the supervision of the Department. This law, therefore, has been administered as follows:—Inspections of bakeries are made occasionally by an inspector of the Food and Drug Division and as a rule the local board of health is given an opportunity of sending somebody to accompany the inspector on these trips. Usually the local board is glad to do so but occasionally there is apparently no desire to have the local inspector with the State inspector. At the time of the inspection, the owner or manager is informed of any violations or defects which may be found. A summary of these defects is then written up and sent to the local board of health with a request that the board see that the defects are corrected. It was formerly found necessary to check up in this follow-up work but recently this has been found to be unnecessary and the boards of health are, as a rule, quick to check up in the offending establishments and good results are promptly evident.

When the law went into effect, cellar and basement bakeries were predominant in tenement houses as well as in business structures. These places had not been wired for electricity and dim gas burners furnished about the only light available while fresh air and daylight were more or less excluded. Many of these cellar bakeries were infested with rats and other vermin, accompanied in many instances by foul odors. Many street floor locations were also woefully lacking in the essentials of clean food production. Not only were the business quarters undesirable, but the equipment in numerable instances was of a makeshift type which could be kept clean only with great difficulty. Free and easy methods were employed in these bakeries practically at all times, most of the energy being spent on production and but little in cleaning. In some localities, faulty places which could not be improved were banned as food shops and the owners of the establishments were advised to seek new quarters. Invariably, the new quarters selected were of a most commendable type.



Some of the unsanitary conditions found were escaping gas from old ovens; hot water supply inadequate for employees' cleanliness and for cleaning the plant; no soap or towels provided for employees; smoking and chewing of tobacco; cockroaches and water bugs; ineffective measures against rats and flies; the use of horse blankets on bread and rising dough; open coal bins and ash pits in the bakery; domestic cooking and sleeping; and, occasionally, laundry work in the bakery; keeping birds and other animals in the bakery; wrapping bread in dirty newspapers; open toilets in the bakery; and, occasionally, the bakery being used for general storage purposes. On one occasion, the proofing closet usually employed to furnish a satisfactory atmosphere for rising dough was found to be used as a temporary bathroom by a member of the baker's family. A small tub filled with water was brought into use. The baker denied the use of this closet for bathing purposes notwithstanding the circumstantial evidence connected with the case.

The inspections made by this Department constituted a complete survey of each city and town requiring pretty nearly three years for this purpose as only one man, part time, could be devoted to the work. This relieved the local boards of health of criticism that the bakeries in the neighboring town were not obliged to meet with the requirements put upon the local bakeries. As a result of this system of inspection, many local authorities have expressed themselves quite pleased with the support given by the Department as well as with the results obtained.

The work of the past ten years has resulted in the elimination of the generally unclean bakery, for this type of bakery is now a rarity. In its place is to be found the well lighted, clean, sanitary plant with improved methods and improved equipment which can readily be cleaned and which is kept clean. The owners of most plants today welcome the visit of a State inspector and are anxious to adopt the just criticisms when conditions do not conform to the statutes. In contrast to conditions of former years, it has been noted that full or part-time employees are now engaged by the bakers to devote their attention entirely to the cleaning of the plants. Provisions are now being made, even in the small plants, to handle this important phase of the work in the systematic manner which it deserves.

The Massachusetts bakeries today show an almost complete transformation in regard to cleanliness. Evolutionary rather than revolutionary methods were employed to bring this about without antagonism or unnecessary force. If the baker showed any disposition not to comply with the orders of the board of health, he was given a hearing at which the representative of this Department was frequently present. A few court cases, followed by the imposition of fines, convinced the baker of the desirability of complying with the request of the board of health. It can be said that the force of the statute insisting that bakeries be maintained in a sanitary condition well lubricated the machinery of evolution.

It was noted during the past two years in sending letters of defects to local boards of health that the defects were almost trivial in most instances and were far less than those sent some years ago. Dr. George L. Drury, veterinary inspector of the Division, who has done most of the bakery inspection work, was therefore requested to tabulate the results of the inspections made ten years ago with those made recently. He found that during 1920 to 1923 the Department inspected practically all the bakeries in 26 towns and during the past two years repeated this inspection in the same towns. The following table gives a summary of the defects found in these 26 localities on the first inspections and a summary of the defects found in the last inspection. The bulk of the defects found in the last inspection were of a minor character which could have well been overlooked on the first inspection as they would have been overshadowed by the glaring defects found at that time. There has been calculated the average defect per bakery and this figure is included in the table. It is worthy of note that this figure is much less in the last inspection than it was in the first inspection. The first inspection covered 825 bakeries with a total number of defects of 2,895, the average defect per bakery being 3.51. In the last inspection, 609 bakeries were inspected in the same localities, with only 443 defects, an average defect of 0.72 per bakery. Today, while 100 per cent plants are in the minority, the defects as noted in the summary are of a lesser character.

Not only has the public welcomed clean food shops, but the owner as well, for,

because of the improved cleanliness, he has increased his business, resulting in a gradual conquest of the housewife to whom baking is, unfortunately, becoming a lost art.

During the fiscal year, the Department inspected 752 bakeries and the inspection revealed 447 defects. In view of the fact that many bakeries showed more than one defect, it is very evident that nearly half the bakeries showed no defects. A summary of these defects is given in Table 8.

The local boards of health report that during the year they have made 3,851 bakery inspections, have given 409 verbal warnings, and 310 written warnings. The proprietors of two bakeries were summoned before local boards for hearings and the local boards of health closed two other bakeries.

### *Comparative Results of Bakery Inspection*

City or Town	Year	FIRST INSPECTION			LAST INSPECTION			
		Number of Bakeries Inspected	Number of Defects	Average Defects per Bakery	Year	Number of Bakeries Inspected	Number of Defects	Average Defects per Bakery
A	1921	5	36	7.2	1930	6	4	0.67
B	1921	12	75	6.2	1930	11	13	1.18
C	1921	11	64	5.8	1931	14	11	0.79
D	1921	23	130	5.7	1931	14	9	0.64
E	1921	10	56	5.6	1931	6	5	0.83
F	1921	12	66	5.5	1930	4	6	1.50
G	1921	7	36	5.1	1931	7	11	1.57
H	1921	14	70	5.0	1931	11	4	0.37
I	1922	7	34	4.9	1930	8	4	0.50
J	1921	24	115	4.8	1930	28	20	0.72
K	1921	35	165	4.7	1931	28	22	0.78
L	1921	15	66	4.4	1931	10	6	0.60
M	1921	80	315	3.9	1931	55	19	0.34
N	1921	13	51	3.9	1931	8	17	2.12
O	1920	76	290	3.8	1930	51	114	2.24
P	1922	16	58	3.6	1931	16	14	0.87
Q	1921	9	31	3.5	1929	8	5	0.63
R	1921	14	48	3.4	1931	11	6	0.54
S	1921	70	230	3.3	1931	41	19	0.46
T	1921	80	248	3.1	1931	71	33	0.47
U	1921	131	382	2.9	1931	61	14	0.23
V	1922	8	22	2.7	1931	9	14	1.46
W	1923	68	148	2.2	1930	72	68	0.98
X	1922	6	12	2.0	1930	7	3	0.43
Y	1922	72	138	1.9	1929	46	12	0.46
Z	1923	7	9	1.3	1931	6	0	0.00
Totals		825	2,895	3.51		609	443	0.72

### COLD STORAGE

There are 63 licensed cold storage warehouses in Massachusetts. These have been inspected during the course of the routine work and have been found to be operated in a sanitary condition. The statistics of the amounts of articles placed in storage and the amounts of articles held in storage will be found in Tables 9, 10, 11, and 12.

Owing to business conditions, there was naturally an unusual number of requests for extension of time in cold storage. Material bought at a fairly high price was stored with the intention of selling it at a profit, and when the selling time arrived there was no market as the price of fresh goods was below that of the original cost of the storage goods. For this reason, extension of time was necessary in order to give the depositors an opportunity to sell the material, the bulk of which was sold at a loss. In many instances the banks held mortgages on the goods and the resulting sale meant a total loss to the depositor. A number of extensions were granted for storage of frozen eggs. This commodity is used exclusively by bakers, and due to the financial depression the demand for cake dropped considerably.

The total amounts of food held in cold storage are not what would be considered excessive; in fact, they do not vary much from what is stored during normal times.

Tables 13, 14, and 15 give the result of requests for extension of time and action of the Department on goods which have been stored for more than 12 months without a request for extension. Each extension was granted because the article in question was in proper shape for further storage.



## SLAUGHTERING INSPECTION

The cities and towns, except Boston, are required annually to nominate one or more inspectors of slaughtering and are required to appoint these inspectors after receiving the approval of this Department. There are approximately 500 such nominations made during the month of March, most of which are renominations of the men holding office at that time. There are submitted the names of approximately 50 men who have not previously held the position. Each one of these men is carefully interviewed by one of the inspectors of the Division and if he is found to be properly qualified for the position he is approved. Each person is carefully instructed as to the statutory requirements of the office, with particular reference to stamping only carcasses of animals which he has seen slaughtered. Each inspector is sent a copy of the law and a copy of the regulations. Each inspector submits a report each month of the number of carcasses inspected, the number of carcasses confiscated, and the reasons for such confiscations. These reports are looked over very carefully, and if the percentage of confiscations appears to be low, investigations are made in order to ascertain the reason, and in many instances there is a valid excuse for the low percentage of confiscations. The inspectors who are most careful in their inspections are liable to show low confiscations because the butchers will not kill suspicious animals under their inspection, but prefer to send such animals elsewhere. Notwithstanding the instructions which these inspectors have received, it was necessary during the course of the year to remove seven, the principal cause of removal being stamping carcasses of animals which the inspectors had not seen killed. In a few instances, the local boards of health were informed that unless they removed the inspector, the Department would do so. In two such instances, the local boards removed the man. In two other instances, the inspector chose to resign rather than be removed.

Notwithstanding these occasional violations, it can be said that the slaughtering inspection of the State is upon a very high plane. The men as a whole are intelligent men who understand their business and show an inclination to do the work properly.

Tables 16 and 17 give a summary of the total carcasses inspected and confiscated, and a summary of the reasons for confiscation in each instance.

## CONFISCATIONS

The inspectors, in connection with the routine work, were obliged to make a number of confiscations of articles of food. A summary of these will be found in Table 18.

## MATTRESS INSPECTION

Most of the mattress factories were inspected during the course of the year, and it was found that on the whole there was compliance with the law. There were a few minor violations, such as selling secondhand mattresses with a statement to that effect upon a white label rather than upon a red label. There were a few violations in connection with the remaking of mattresses, and, in a few instances, mattresses were falsely labeled as to the nature of the material used for filling.

During the last part of the year it was ascertained that the price of the raw material used for filling in the case of vegetable fibres was in many instances below the cost of secondhand material, and, consequently, there was no incentive to use secondhand material unless the manufacturer had a stock on hand.

## SHELLFISH

The usual routine work in connection with the issuing of certificates for use in the exportation of shellfish was carried on during the year. Shellfish were also examined for sewage pollution and it was found that plenty of clams were on the market which were sewage polluted. In all these instances the vendors of the clams brought forward evidence to show that the clams were obtained from areas approved by the Department or had been obtained in interstate commerce from persons on the U. S. Public Health Service list.

A change in the statutes renders it practically impossible to convict a person who submits the above evidence to the court, the burden of proof being placed upon the Commonwealth to show that the polluted shellfish in fact came from polluted areas or to show that the pollution was caused by the person taking the shellfish. It seems unfortunate that legislation of this character,—to make it safe to sell sewage polluted food, is placed upon the books.



TABLE 1. — *For Sale of Milk not of Good Standard Quality*

NAME	ADDRESS	COURT	DATE	RESULT
Anderson & Patterson, Inc.	Worcester	Worcester	May 21, 1931	Conviction
Benoit, Arthur	Winchendon	Winchendon	June 15, 1931	Conviction
Christopher, Spero	Cambridge	Cambridge	Apr. 16, 1931	Conviction
Clark's Spa, Inc.	Cambridge	Cambridge	Oct. 27, 1931	Conviction
Clifford, Owen	Ludlow	Ludlow	July 17, 1931	-1
Dawson, Irving	Needham Heights	Dedham	Dec. 8, 1930	Conviction
Demirjian, Mardiros	Worcester	Worcester	May 28, 1931	Conviction
Duc, Joseph	Wilbraham	Palmer	July 16, 1931	Conviction
Dyer, Najeep	Hingham	Hingham	Aug. 21, 1931	Conviction
Florini, John	North Adams	North Adams	Jan. 30, 1931	Conviction
Fortin, Joseph	Middleboro	Middleboro	June 30, 1931	Conviction
Futek, Peter	West Springfield	Springfield	Sept. 4, 1931	Conviction
Garas, Paul	Hingham	Hingham	Aug. 21, 1931	Conviction
Garello, Angelo	North Adams	North Adams	Apr. 24, 1931	Conviction
Ghiloni, Frank	Marlborough	Marlborough	June 18, 1931	Conviction
Helfrich, Phillip	Salisbury	Amesbury	Aug. 21, 1931	Conviction
Higgins, Edward J.	Worcester	Worcester	May 21, 1931	Conviction
Hooke, Fred V.	Salisbury	Amesbury	Aug. 21, 1931	Conviction
Hood & Sons Inc., H. P.	Lawrence	Lawrence	Oct. 6, 1931	Conviction
Hood & Sons Inc., H. P.	Lawrence	Lawrence	Oct. 6, 1931	Conviction
Hood & Sons Inc., H. P.	Lawrence	Lawrence	Oct. 6, 1931	Conviction
Ivashko, Efrem	West Springfield	Springfield	Sept. 4, 1931	Conviction
Jordan, Mary	Oak Bluffs	Oak Bluffs	Aug. 28, 1931	Conviction
Karras, Louis	Needham	Dedham	Dec. 8, 1930	Conviction
Kelley, James M.	Hingham	Hingham	Aug. 21, 1931	Conviction
Kusiak, Sebastian	Chicopee Falls	Chicopee	Sept. 4, 1931	Conviction
Lavoie, Ephraim	Ludlow	Springfield	July 16, 1931	Conviction
Law, Arthur E.	Methuen	Lawrence	Oct. 9, 1931	Conviction
Law, Arthur E.	Methuen	Lawrence	Oct. 9, 1931	Conviction
MacNeil, George	Oak Bluffs	Oak Bluffs	Aug. 28, 1931	Conviction
Marceau, Mattie	Vineyard Haven	Oak Bluffs	Sept. 24, 1931	Conviction
Massasoit Lunch	Holyoke	Holyoke	June 12, 1931	Conviction
Masterson, Anne	Hingham	Hingham	Aug. 31, 1931	Conviction
Noel, Francis	North Adams	North Adams	June 26, 1931	Conviction
Pajak, Stanley	Chicopee Falls	Chicopee	Sept. 4, 1931	Conviction
Panaitias, George	Lynn	Lynn	Oct. 23, 1931	Conviction
Patronas, William	Worcester	Worcester	June 11, 1931	Conviction
Poulos, Nicholas	Stoughton	Stoughton	Apr. 6, 1931	Conviction
Poulos, Nicholas	Stoughton	Dedham	Sept. 29, 1931	Conviction
Roumas, Charles	Beverly	Salem	Feb. 4, 1931	Conviction
Saklas, Christos	Worcester	Worcester	May 28, 1931	Conviction
Tsouprakakis, Anthony	Cambridge	Cambridge	Apr. 16, 1931	Conviction
Walker, Joseph L.	Barnstable	Barnstable	June 23, 1931	Conviction
Yagobbian, Sarkis	Worcester	Worcester	June 11, 1931	Conviction

<sup>1</sup> On file without finding.

*For Sale of Milk from Which a Portion of the Cream had been removed*

Banas, Thomas	Ware	Ware	June 19, 1931	Conviction
Berry, Lester E.	Berlin	Clinton	Nov. 17, 1931	Conviction
Davis, Henry K.	Charlton Depot	Southbridge	July 24, 1931	Conviction
Duda, Anthony	Ware	Ware	June 19, 1931	Conviction
Gascon, Raymond	North Brookfield	East Brookfield	June 19, 1931	Conviction
Hood & Sons, H. P.	Cambridge	Cambridge	Apr. 10, 1931	Conviction
Hood & Sons Inc., H. P.	Lynn	Lynn	Sept. 28, 1931	Conviction
Kopinos, Walter	West Springfield	Springfield	June 4, 1931	Conviction
McCarthy, Thomas	Winchendon	Winchendon	June 8, 1931	Conviction
Sykes, Louis	Norwood	Dedham	Jan. 9, 1931	Conviction

*For Sale of Milk Containing Added Water*

Clark, Arthur	Easthampton	Northampton	Oct. 8, 1931	Conviction
Cronin, Timothy J.	Milford	Milford	May 15, 1931	Conviction
Flores, Manuel	Somerset	Fall River	July 10, 1931	Conviction
Jowdy, Nemer	Methuen	Methuen	May 4, 1931	Conviction
Lopes, John	Somerset	Fall River	July 10, 1931	Conviction
Mattison, William	Hubbardston	Gardner	Mar. 20, 1931	Conviction
Menard, Charles N.	Westport	Fall River	Apr. 27, 1931	Conviction
Mihranian, Manoog	Methuen	Methuen	Apr. 17, 1931	Conviction
Norman, George	Westport	Fall River	May 5, 1931	Conviction <sup>1</sup>
Silva, John	Hudson	Hudson	Nov. 23, 1931	Conviction

<sup>1</sup> Appealed.

*Selling Skimmed Milk Without Properly Labeling the Container*

Alta Crest Farm, Inc.	Spencer	East Brookfield	Sept. 24, 1931	Conviction
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*Selling Unpasteurized Milk as Pasteurized*

Alta Crest Farm, Inc.	Spencer	East Brookfield	Sept. 24, 1931	Conviction
Carlton, Earl F.	West Springfield	Springfield	Jan. 28, 1931	Conviction
Elm Spring Farm Co.	Waltham	Waltham	May 19, 1931	Discharged
Gilgun, James J.	Malden	Malden	Apr. 29, 1931	Conviction
Jowdy, Nemer	Methuen	Methuen	May 4, 1931	Conviction

*For Violation of Pasteurization Law and Regulations*

NAME	ADDRESS	COURT	DATE	RESULT
Ashland Farm Milk Co., Inc.	Holbrook	Quincy	June 11, 1931	Conviction <sup>1</sup>
Cape Ann Dairy, Inc.	Essex	Gloucester	Oct. 9, 1931	Conviction
Carlton, Earl F.	West Springfield	Springfield	Jan. 28, 1931	Conviction
Carlton, Earl F.	West Springfield	Springfield	Jan. 28, 1931	Conviction
Clifford, Owen	Ludlow	Ludlow	July 17, 1931	-2
Conant, Benjamin V.	Danvers	Salem	Feb. 10, 1931	Conviction
Corey, Manuel	Fall River	Fall River	Oct. 9, 1931	Conviction
Dunajski Brothers	Peabody	Peabody	Oct. 6, 1931	Conviction
Elliott, Wilbur P.	Lynn	Lynn	Feb. 3, 1931	Conviction
Faherty, Patrick	Quincy	Quincy	July 31, 1931	Conviction
Fortier, Sylvia	Fall River	Fall River	Oct. 9, 1931	Conviction
Frydich, Peter (2 counts)	Worcester	Worcester	Nov. 3, 1931	Conviction
Jones Company, W. T.	Chelsea	Chelsea	Jan. 3, 1931	Conviction
Manning, Harriet M.	Milton	Quincy	Nov. 19, 1931	Dismissed
Michalowski, Anthony (2 counts)	Danvers	Salem	Oct. 6, 1931	Conviction <sup>1</sup>
Sellers, John A.	Lexington	Concord	Oct. 5, 1931	Conviction
Spohr, William	Haverhill	Haverhill	Oct. 1, 1931	Conviction
United Farmers Cooperative Creamery Assoc. (2 counts)	Charlestown	Charlestown	Nov. 20, 1931	Conviction
Whiting Milk Cos.	Charlestown	Charlestown	May 28, 1931	Conviction
Zervas, George	Ipswich	Ipswich	Jan. 31, 1931	Conviction
Zervas, George	Ipswich	Ipswich	Aug. 24, 1931	Conviction

<sup>1</sup> Appeal.<sup>2</sup> On file without finding.*For Violation of Grade-A Regulations*

Clover Leaf Dairy, Inc.	Haverhill	Amesbury	Sept. 14, 1931	Conviction
Deary, Thomas	Dudley	Southbridge	Nov. 6, 1931	Conviction
Elm Spring Farm, Inc.	Waltham	Waltham	May 19, 1931	Conviction <sup>1</sup>
Spear, Clinton W.	Wakefield	Peabody	Sept. 18, 1931	Conviction
Whiting Milk Cos.	Charlestown	Charlestown	May 28, 1931	Discharged
Whiting Milk Cos.	Charlestown	Charlestown	May 28, 1931	Conviction

*For Sale of Adulterated or Misbranded Foods Other than Milk and Milk Products*

## CLAMS

[Contained added water]

Fitts Brothers, Inc.	Framingham	Framingham	Dec. 17, 1930	Conviction
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## CLAMS

[Sewage polluted]

Bayley, Samuel	Ipswich	Ipswich	June 20, 1931	Conviction
Cann's Sea Grill, Inc.	Boston	Boston	Jan. 9, 1931	Conviction
Finn, William E.	Middleboro	New Bedford	Jan. 13, 1931	Conviction <sup>1</sup>
Gilmore, George L.	Ipswich	Ipswich	Oct. 7, 1931	Discharged
Peck, Adelbert M.	Swansea	Fall River	Apr. 22, 1931	Conviction
Tripp, Loring	North Rochester	New Bedford	May 12, 1931	Conviction

<sup>1</sup> Appealed

## HAMBURG STEAK

(Selling, or offering for sale, meat containing sodium sulphite in violation of the regulations of the Department of Public Health)

Armata, Mary	Holyoke	Holyoke	June 12, 1931	Conviction
Babel, Paul	Norwood	Dedham	Apr. 30, 1931	Conviction
Baker Market Co., Inc.	Fall River	Fall River	Jan. 9, 1931	Conviction
Blair's Foodland, Inc.	Roxbury	Roxbury	Mar. 5, 1931	Conviction
Busanski, Herman	Springfield	Springfield	July 2, 1931	Conviction
Cohen, Abraham	Roxbury	Roxbury	Mar. 18, 1931	Conviction
Cohn, Elias	Springfield	Springfield	Oct. 22, 1931	Conviction
Cramer, William	North Adams	North Adams	Dec. 11, 1930	Conviction
Crocker, Charles	Everett	Malden	Jan. 2, 1931	Conviction
Devine, John	Lynn	Lynn	Jan. 8, 1931	Conviction
Economy Grocery Stores, Inc.	Springfield	Springfield	July 23, 1931	Dismissed
Goldstein, Alex	Worcester	Worcester	Jan. 15, 1931	Conviction
Goldstein, Alex	Worcester	Worcester	June 3, 1931	Conviction
Gross, Benjamin	Roxbury	Roxbury	Mar. 5, 1931	Conviction
Harris, Roy E.	Newburyport	Ipswich	Jan. 23, 1931	Conviction
Hassapes, Alex	Marlborough	Marlborough	June 18, 1931	Conviction <sup>1</sup>
Kaufman, Edward J.	Lynn	Lynn	Dec. 24, 1930	Conviction
Kramer, Harry	Hudson	Hudson	Mar. 25, 1931	Conviction
Kravitz, Robert	New Bedford	New Bedford	Apr. 7, 1931	Conviction
Kronick, Simon	North Adams	North Adams	June 26, 1931	Conviction
Mayflower Meat Market, Inc.	Lynn	Lynn	Jan. 8, 1931	Conviction
Moro, Enrico	Attleboro	Attleboro	Jan. 2, 1931	Conviction
Racoff, Barnett	Roxbury	Roxbury	Mar. 18, 1931	Conviction
Robinson, Mary	Roxbury	Roxbury	Mar. 18, 1931	Conviction
Rudnick, Louis	North Adams	North Adams	Mar. 27, 1931	Conviction
Sawyer, Sol	Taunton	Taunton	Mar. 12, 1931	Conviction
Seigel, Louis	Roxbury	Roxbury	Mar. 5, 1931	Conviction
Stark Supply Co.	Roxbury	Roxbury	Mar. 18, 1931	Conviction
Sweet's Market, Inc.	Roxbury	Roxbury	Mar. 23, 1931	Conviction
Vanasse, Lewis P.	Fall River	Fall River	Jan. 9, 1931	Conviction
Walker, George	Salem	Salem	Jan. 16, 1931	Conviction
Yameen, George	Lawrence	Lawrence	May 22, 1931	Conviction
Yeoman, Richard W.	Lynn	Lynn	Dec. 5, 1930	Conviction

<sup>1</sup> Suspended for sentence for one year.

*For Sale of Adulterated or Misbranded Foods Other than Milk and Milk Products—*

## Continued

## MAPLE SYRUP

(Contained cane sugar)

NAME	ADDRESS	COURT	DATE	RESULT
Sotes, Maude . . . .	Onset . . . . .	Wareham . . . . .	Oct. 22, 1931	Conviction

*Sale of Diseased Meat*

Cohen, Abraham . . . .	Turners Falls . . . .	Greenfield . . . .	Mar. 3, 1931	Conviction
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## SAUSAGE

(Contained starch in excess of 2 per cent)

Albert, David . . . .	North Andover . . . .	North Andover . . . .	Mar. 23, 1931	Conviction
Allison, William H. . .	Lynn . . . . .	Lynn . . . . .	Feb. 26, 1931	Conviction
Almond, William . . . .	New Bedford . . . . .	New Bedford . . . . .	Mar. 10, 1931	Conviction
Corey, George . . . .	Lawrence . . . . .	Lawrence . . . . .	Apr. 22, 1931	Conviction
Ferejohn, John . . . .	Pittsfield . . . . .	Pittsfield . . . . .	Dec. 19, 1930	Conviction
Johnson, Myron . . . .	Athol . . . . .	Athol . . . . .	May 18, 1931	Conviction
Levitt, David B. . . .	Springfield . . . . .	Springfield . . . . .	Feb. 18, 1931	Conviction
MacGibbon, Robert . . .	Quincy . . . . .	Quincy . . . . .	Feb. 4, 1931	Conviction
Moro, Enrico . . . .	Attleboro . . . . .	Attleboro . . . . .	Jan. 2, 1931	Conviction
Parker, Charles A. . . .	North Andover . . . .	North Andover . . . .	Mar. 23, 1931	Conviction
Porter, Vernon R. . . .	Brockton . . . . .	Brockton . . . . .	July 11, 1931	Dismissed
Rayner, Alfred . . . .	Holyoke . . . . .	Holyoke . . . . .	Feb. 6, 1931	Conviction
Staveley, Henry . . . .	Fitchburg . . . . .	Fitchburg . . . . .	Jan. 22, 1931	Conviction
Stringer, Robert . . . .	Lowell . . . . .	Lowell . . . . .	Feb. 24, 1931	Conviction <sup>1</sup>
The C. F. Anderson Mar- kets, Inc. . . . .	Brockton . . . . .	Brockton . . . . .	July 11, 1931	Dismissed
Thurber, Charles . . . .	Attleboro . . . . .	Attleboro . . . . .	Jan. 9, 1931	Conviction
Thurber, Charles . . . .	Attleboro . . . . .	Attleboro . . . . .	Jan. 23, 1931	Conviction
Wojtaszek, John . . . .	Adams . . . . .	Adams . . . . .	Feb. 13, 1931	Discharged
Zasadzinski, Michael . .	Holyoke . . . . .	Holyoke . . . . .	Feb. 6, 1931	Conviction

<sup>1</sup> Continued 1 year for disposition.

## SAUSAGE

(Contained a compound of sulphur dioxide not properly labeled)

Barthel, Eugene . . . .	Gardner . . . . .	Gardner . . . . .	June 5, 1931	Conviction
Carlin, Vincent . . . .	Springfield . . . . .	Springfield . . . . .	Feb. 18, 1931	Conviction
Corey, George . . . .	Lawrence . . . . .	Lawrence . . . . .	Apr. 22, 1931	Conviction
Dabosz, John . . . .	Holyoke . . . . .	Holyoke . . . . .	June 12, 1931	Conviction
New England Provision Co. .	Boston . . . . .	Salem . . . . .	Feb. 26, 1931	Conviction
New England Provision Co. .	Boston . . . . .	Boston . . . . .	Apr. 2, 1931	Conviction
Scheu, Frederick L. . . .	Boston . . . . .	Boston . . . . .	Jan. 14, 1931	Conviction
Strauss Roth Stores, Inc. .	Lynn . . . . .	Lynn . . . . .	Jan. 8, 1931	Conviction
Strauss Roth Stores, Inc. .	Salem . . . . .	Salem . . . . .	Feb. 10, 1931	Conviction

*For Sale of Decomposed Food*

## CORNED BEEF

Racoff, Hyman . . . .	Roxbury . . . . .	Roxbury . . . . .	Oct. 23, 1931	Conviction
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## EGGS

Baldo, Francesco G. . . .	New Bedford . . . . .	New Bedford . . . . .	Oct. 6, 1931	Conviction
Berenson, Aaron J. . . .	Lawrence . . . . .	Lawrence . . . . .	Nov. 20, 1931	Conviction
Diozzi, Primo . . . .	Somerville . . . . .	Somerville . . . . .	Feb. 25, 1931	Conviction
First National Stores, Inc. .	Ipswich . . . . .	Ipswich . . . . .	Oct. 3, 1931	Conviction
First National Stores, Inc. .	Frammingham . . . . .	Frammingham . . . . .	Mar. 28, 1931	Conviction
First National Stores, Inc. .	Mattapan . . . . .	Dorchester . . . . .	Nov. 30, 1931	Conviction
Gray United Stores, Inc. .	Essex . . . . .	Gloucester . . . . .	Oct. 22, 1931	Conviction
Gray United Stores, Inc. .	Stoughton . . . . .	Stoughton . . . . .	Nov. 10, 1931	Conviction
Keiser, Bernard . . . .	Springfield . . . . .	Springfield . . . . .	Feb. 5, 1931	Conviction
Macerro, Nicholas . . . .	Somerville . . . . .	Somerville . . . . .	Feb. 17, 1931	Conviction
Mayflower Poultry Corp. .	Boston . . . . .	Stoughton . . . . .	Nov. 10, 1931	Discharged
Paresky, Maurice I. . . .	Lawrence . . . . .	Lawrence . . . . .	Nov. 20, 1931	Conviction
Rulnick, Harry . . . .	Springfield . . . . .	Springfield . . . . .	Mar. 4, 1931	Conviction
Tillman, Sam . . . .	Springfield . . . . .	Springfield . . . . .	Nov. 19, 1931	Conviction
Wilson, G. Henry . . . .	Spencer . . . . .	East Brookfield . . . .	July 8, 1931	Conviction

## HAMBURG STEAK

Economy Grocery Stores, Inc. . . . .	Springfield . . . . .	Springfield . . . . .	July 23, 1931	Conviction <sup>1</sup>
Foster, Carl . . . .	Boston . . . . .	Boston . . . . .	May 8, 1931	Conviction
Grand Union Grocery Stores, Inc. . . . .	Springfield . . . . .	Springfield . . . . .	Nov. 19, 1931	Conviction

## LIVER

Strauss, Inc., Nathan . .	Springfield . . . . .	Springfield . . . . .	July 9, 1931	Conviction
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## ROASTING PORK

Strauss, Inc., Nathan . .	Springfield . . . . .	Springfield . . . . .	July 9, 1931	Conviction
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## SAUSAGE

Weich, Frederick . . . .	Malden . . . . .	Malden . . . . .	Feb. 5, 1931	Discharged
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<sup>1</sup> Appealed.



*False and Misleading Advertising*

## Eggs

[Representing eggs which were not fresh as fresh eggs]

NAME	ADDRESS	COURT	DATE	RESULT
Allen, Charles R.	Lowell	Lowell	Dec. 26, 1930	Conviction
Bender, Samuel	Roxbury	Roxbury	Feb. 18, 1931	Conviction
Branchi, Leo A.	Springfield	Springfield	Nov. 5, 1931	Conviction
Checkoway, Samuel	Amesbury	Amesbury	Oct. 14, 1931	Conviction
Gagnon, George A.	Fall River	Fall River	Jan. 9, 1931	- 1
Growers Outlet, Inc.	Springfield	Springfield	Jan. 28, 1931	Conviction
Growers Outlet, Inc.	Springfield	Springfield	Mar. 4, 1931	Conviction
Gullason, Charles	Watertown	Waltham	Dec. 11, 1930	Conviction
Manhattan Food Stores Co., Inc.	Somerville	Somerville	Mar. 26, 1931	Conviction
Miller, Abraham	New Bedford	New Bedford	Apr. 7, 1931	Conviction
Morakis, Anthony	Cambridge	Cambridge	Nov. 9, 1931	Conviction
Shore, Albert	Worcester	Worcester	Mar. 11, 1931	Conviction
Sigman, Morris	Beverly	Salem	Oct. 26, 1931	Conviction
Snyder, George	Lynn	Lynn	Jan. 7, 1931	Conviction
Steinberg, Rose	Roxbury	Roxbury	Mar. 5, 1931	Conviction
The Massachusetts Mohican Co.	Springfield	Springfield	Jan. 21, 1931	Conviction
Weinstein, Hyman	Waltham	Waltham	Jan. 5, 1931	Conviction

## FOWL

[Falsely advertising as fresh killed fowl]

Druifuss, Martel	Springfield	Springfield	July 9, 1931	Conviction
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## MAPLE SUGAR

[False advertising of maple sugar]

Woulas, Nicolas	Southbridge	Southbridge	Sept. 25, 1931	Conviction
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<sup>1</sup> On file without finding.

## MAPLE SYRUP

[False advertising of maple syrup]

Allen, Clifford W.	Nantucket	Nantucket	Sept. 1, 1931	Conviction
Cobb, George F.	Falmouth	Barnstable	June 23, 1931	Conviction
Douros, Christos	Roxbury	Roxbury	Apr. 9, 1931	Conviction
Gorman, Fred M.	Gloucester	Gloucester	Aug. 17, 1931	Conviction
Helmis, Ernest	Falmouth	Barnstable	July 31, 1931	Conviction
Kelley, James M.	Hingham	Hingham	Aug. 21, 1931	Conviction
Kougiass, Nicholas	New Bedford	New Bedford	Sept. 2, 1931	Conviction
Modern Lunch, Inc.	Nantucket	Nantucket	Sept. 7, 1931	Conviction
O'Connell, John H.	Nantucket	Nantucket	Aug. 31, 1931	Conviction
Pappas, James	Palmer	Palmer	June 19, 1931	Conviction
The Massachusetts Mohican Co.	Springfield	Springfield	Jan. 21, 1931	Conviction

*Violation of Sanitary Food Law*

Halberstadt, Albert	Newtonville	Newton	Jan. 30, 1931	Conviction
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*For Sale of Drugs Deficient in Strength*

## ARGYROL

Humphrey, James B.	Winchendon	Winchendon	Oct. 5, 1931	Conviction
Levin, Louis	Northampton	Northampton	Oct. 8, 1931	Conviction

## CITRATE OF MAGNESIA

Penn, Maurice	Lawrence	Lawrence	Dec. 8, 1930	Conviction
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## SWEET SPIRIT OF NITRE

Corsiglia, John	Greenfield	Greenfield	June 16, 1931	Conviction
Davis & Co., William L.	Worcester	Worcester	Dec. 12, 1930	Conviction
Ferris, William	Springfield	Springfield	Oct. 14, 1931	Conviction
Finnish Drug Co., Inc.	Fitchburg	Fitchburg	June 17, 1931	Conviction
Frodema, Henry	Springfield	Springfield	Apr. 22, 1931	Conviction
Glazer, Jacob	Milton	Quincy	Sept. 28, 1931	Conviction
Guerin, James F.	Worcester	Worcester	Jan. 15, 1931	Conviction
Iris, Benjamin	Falmouth	Barnstable	Sept. 23, 1931	Conviction
Kidder & Co., Inc., Samuel	Charlestown	Somerville	Apr. 22, 1931	Conviction
Kidder & Co., Inc., Samuel	Charlestown	Fitchburg	July 3, 1931	Conviction
Kidder & Co., Inc., Samuel	Boston	New Bedford	Sept. 29, 1931	Conviction
Lawrence Wholesale Drug Co.	Lawrence	Lynn	Nov. 16, 1931	Conviction
LeDame, Arthur H.	Adams	Adams	Nov. 5, 1931	Discharged
March, Andrew H.	Shelburne	Greenfield	Sept. 4, 1931	Conviction
McClure, Ernest B.	Somerville	Somerville	Feb. 17, 1931	Conviction
McKesson-Eastern Drug Co.	Worcester	Worcester	Jan. 15, 1931	Conviction
McKesson-Eastern Drug Co.	Boston	Boston	Mar. 11, 1931	Conviction
McKesson-Eastern Drug Co.	Boston	Boston	Mar. 11, 1931	Conviction
McKesson-Eastern Drug Co.	Springfield	Adams	Aug. 20, 1931	Conviction
Tavelli, Louis O.	Williamstown	Williamstown	June 26, 1931	Conviction

*For Violation of the Laws Relative to Cold Storage*

## SELLING COLD STORAGE EGGS WITHOUT MARKING THE CONTAINER

NAME	ADDRESS	COURT	DATE	RESULT
Abrahams, Morris	Pittsfield	Pittsfield	Dec. 4, 1930	Conviction
Algiro, Patsy	Springfield	Springfield	Feb. 5, 1931	Conviction
Ambrose, Pietro D.	Lynn	Lynn	Dec. 18, 1930	Conviction
Barsarian, Milan	Lowell	Lowell	Dec. 1, 1930	Conviction
Berkatsky, Harry	Springfield	Springfield	Jan. 28, 1931	Conviction
Bezis, Nicholas	Salem	Salem	Feb. 19, 1931	Conviction
Bonsignori, Frank	Cambridge	Cambridge	Nov. 16, 1931	Conviction
Boschetti, Dominick	North Adams	North Adams	Dec. 11, 1930	Conviction
Bouchard, Albert	Salem	Salem	Dec. 12, 1930	Conviction
Brockelman Brothers, Inc.	Fitchburg	Fitchburg	Dec. 5, 1930	Conviction
Brzozoski, Walter	Salem	Salem	Dec. 2, 1930	Conviction
Castleman, Harry	Salem	Salem	Dec. 12, 1930	Conviction
Castolo & Moura	New Bedford	New Bedford	Apr. 7, 1931	Conviction
Caterino, Frank	Somerville	Somerville	Feb. 25, 1931	Conviction
Colapietro, Leon	Springfield	Springfield	Feb. 5, 1931	Conviction
Crawford, Earl F.	Frammingham	Frammingham	Feb. 6, 1931	Conviction
Curto, Nocola	Springfield	Springfield	Nov. 5, 1931	Conviction
DeBlock, Dominick	Everett	Malden	Dec. 23, 1930	Conviction
Diozzi, Primo	Somerville	Somerville	Feb. 25, 1931	Conviction
Divitre, Carlo	Springfield	Springfield	Nov. 5, 1931	Conviction
Equatowich, Thomas	Springfield	Springfield	Jan. 28, 1931	Conviction
Espinola, Fred	Lowell	Lowell	Dec. 1, 1930	Conviction
Everybody's Fruit and Vegetable Market, Inc.	New Bedford	New Bedford	Apr. 7, 1931	Conviction
Fallon, Patrick	Springfield	Springfield	Jan. 28, 1931	Conviction
Finkelstein, Eli	Everett	Malden	Dec. 23, 1930	Conviction
Gai, Frank	Pittsfield	Pittsfield	Dec. 4, 1930	Conviction
Garber, Wolf	Lynn	Lynn	Dec. 18, 1930	Conviction
Garcia, Antone	New Bedford	New Bedford	Mar. 17, 1931	Conviction
Genthner, Ralph	Danvers	Salem	Dec. 12, 1930	Conviction
Gentile, Alfonso	Springfield	Springfield	Nov. 5, 1931	Conviction
Gilburg, Morris	Springfield	Springfield	Jan. 21, 1931	Conviction
Gold, Carl	Springfield	Springfield	Oct. 22, 1931	Conviction
Gotroff, Louis	Holyoke	Holyoke	Dec. 31, 1930	Conviction
Grand Union Grocery Stores, Inc.	Springfield	Springfield	Nov. 19, 1931	Discharged
Growers Outlet, Inc.	Springfield	Springfield	Jan. 28, 1931	Conviction
Holmes, Harold	Bourne	Barnstable	Nov. 13, 1931	Conviction
Johnson, John T.	Quincy	Quincy	Feb. 4, 1931	Conviction
Kaplan, Israel	Lynn	Lynn	Apr. 7, 1931	Conviction
Keyser, Abraham	Springfield	Springfield	Feb. 5, 1931	Conviction
Klys, Felix	Webster	Webster	Nov. 19, 1931	Conviction
Korol, Katherine	Springfield	Springfield	Jan. 21, 1931	Conviction
Kosofsky, William J.	Everett	Malden	Dec. 23, 1930	Conviction
Kramer, Samuel	Lynn	Lynn	Dec. 18, 1930	Conviction
Kronick, Julius	North Adams	North Adams	Dec. 11, 1930	Conviction
Kutzenko, Joseph	Springfield	Springfield	Nov. 19, 1931	Conviction
Ladd, Warren R.	Winchendon	Winchendon	Oct. 19, 1931	Conviction
Lander, Samuel	Salem	Salem	Dec. 12, 1930	Conviction
Leo, Cosimo	Worcester	Worcester	Nov. 3, 1931	Conviction
Levy, Bessie	Springfield	Springfield	Jan. 21, 1931	Conviction
Litarte, Ulric	Leominster	Leominster	Dec. 24, 1930	Conviction
Macero, Nicholas	Somerville	Somerville	Feb. 17, 1931	Discharged
Manzi, Frank	Worcester	Worcester	Mar. 11, 1931	Conviction
Murphy, Charles J.	Stoughton	Stoughton	Nov. 10, 1931	Conviction
Myzenberg, Morris	Lynn	Lynn	Dec. 24, 1930	Conviction
O'Shea, James	Arlington	Cambridge	Oct. 13, 1931	Conviction
Pechils, Arthur G.	Ipswich	Ipswich	Jan. 23, 1931	Conviction
Richard, Joseph	Salem	Salem	Dec. 12, 1930	Conviction
Richter, Jacob	Roxbury	Roxbury	Mar. 13, 1931	Conviction
Sangiovanni, Guiseppe	Pittsfield	Pittsfield	Dec. 4, 1930	Conviction
Santos, Manuel P.	New Bedford	New Bedford	Mar. 17, 1931	Conviction
Sidorov, Samuel	Lawrence	Lawrence	Nov. 6, 1931	Conviction
Swift and Company	Springfield	Springfield	Nov. 5, 1931	Conviction
Tassone, Antonio	North Adams	North Adams	Dec. 11, 1930	Conviction
Tersignio, Stanislaw	Leominster	Leominster	Dec. 24, 1930	Conviction
The Gloria Chain Stores, Inc.	Newton	Newton	Mar. 6, 1931	Conviction
The Great Atlantic & Pacific Tea Co., Incorporated	Oak Bluffs	Oak Bluffs	Oct. 31, 1931	Conviction
Toscano, Joseph A.	Worcester	Worcester	Nov. 3, 1931	Conviction
Widlansky, Bessie	Springfield	Springfield	Jan. 21, 1931	Conviction

*For Violation of the Laws Relative to Slaughtering*

## SLAUGHTERING OR AUTHORIZING SLAUGHTERING IN THE ABSENCE OF INSPECTOR

Adzima, Peter	Belchertown	Northampton	Nov. 13, 1931	Conviction <sup>1</sup>
August, Samuel	Northampton	Greenfield	Mar. 27, 1931	Conviction
Markham, Clinton	East Longmeadow	Springfield	Sept. 18, 1931	Discharged
Sears, Edwin W.	Charlemont	Greenfield	June 12, 1931	Conviction

<sup>1</sup> Appealed.

## AS INSPECTOR OF SLAUGHTERING USED STAMP ILLEGALLY

Severance, Fred	Gill	Greenfield	Feb. 27, 1931	Conviction
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## For Violation of the Mattress Laws

NAME	ADDRESS	COURT	DATE	RESULT
Aguiar, Antone . . . .	Fall River . . . .	Fall River . . . .	Apr. 24, 1931	Conviction
Friedman, Morris . . .	Waltham . . . .	Waltham . . . .	June 9, 1931	Conviction
Friedman, Morris . . .	Waltham . . . .	Waltham . . . .	June 9, 1931	Conviction
Helfenbein, Harry . . .	Fall River . . . .	Fall River . . . .	Apr. 24, 1931	Conviction
Levenson, Paul . . . .	Springfield . . . .	Springfield . . . .	July 24, 1931	Conviction
Rosenfeld, Abraham . .	New Bedford . . . .	New Bedford . . . .	Apr. 23, 1931	Conviction
Roy, Armand . . . .	Fall River . . . .	Fall River . . . .	Apr. 24, 1931	Conviction

## Obstruction of an Inspector

Goldstein, Alex . . . .	Worcester . . . .	Worcester . . . .	June 3, 1931	Dismissed
Kaufman, Edward J. . .	Lynn . . . .	Lynn . . . .	Dec. 24, 1930	Conviction

TABLE 2. — Summary of Milk Statistics

Number above standard . . . . .	3,970
Number below standard . . . . .	1,095
Total samples . . . . .	5,065
Number having more than 15% Solids . . . . .	22
“ “ between 14% and 15% Solids . . . . .	108
“ “ “ 13% and 14% Solids . . . . .	706
“ “ “ 12% and 13% Solids . . . . .	3,134
“ “ “ 11% and 12% Solids . . . . .	968
“ “ “ 10% and 11% Solids . . . . .	94
“ “ “ 9% and 10% Solids . . . . .	20
“ “ “ 8% and 9% Solids . . . . .	13
Number of samples showing removal of cream . . . . .	73
Number of samples containing added water . . . . .	48
50% of samples with solids between 12.1% and 12.8% . . . . .	
84% of samples with solids between 11.4% and 13.0% . . . . .	

TABLE 3. — Average Composition of Milk Samples

	TOTAL SAMPLES COLLECTED				SAMPLES FOUND NOT ADULTERATED			
	Number	Solids	Fat	Solids not fat	Number	Solids	Fat	Solids not fat
December . . . . .	181	12.67	3.88	8.79	180	12.69	3.89	8.80
January . . . . .	124	12.61	3.82	8.79	123	12.62	3.83	8.79
February . . . . .	126	12.45	3.74	8.71	119	12.61	3.79	8.82
March . . . . .	860	12.38	3.71	8.67	827	12.47	3.75	8.72
April . . . . .	749	12.43	3.76	8.67	738	12.45	3.78	8.67
May . . . . .	891	12.42	3.76	8.66	871	12.45	3.79	8.66
June . . . . .	509	12.37	3.78	8.59	490	12.44	3.82	8.62
July . . . . .	318	12.35	3.76	8.59	311	12.38	3.79	8.59
August . . . . .	417	12.27	3.76	8.51	411	12.29	3.78	8.51
September . . . . .	358	12.18	3.68	8.50	350	12.21	3.70	8.51
October . . . . .	198	12.51	3.82	8.69	194	12.55	3.85	8.70
November . . . . .	85	12.76	3.88	8.78	85	12.76	3.88	8.78
Totals . . . . .	4,812	12.40	3.76	8.64	4,703	12.45	3.78	8.65

TABLE 4. — Summary of Bacteriological Examinations of Milk

		CERTIFIED MILK	
Total samples . . . . .			65
Lowest count . . . . .			less than 100
Highest count . . . . .			15,000
Geometric mean . . . . .			2,114
Number below 10,000 . . . . .			64
Number above 10,000 . . . . .			1
		RAW MILK SOLD AS SUCH	
Total samples . . . . .			60
Lowest count . . . . .			2,200
Highest count . . . . .			330,000
Number below 300,000 . . . . .			58
Number above 300,000 . . . . .			2
		RAW MILK INTENDED TO BE PASTEURIZED	
Total samples . . . . .			3,041
Lowest count . . . . .			300
Highest count . . . . .			22,000,000
Geometric mean . . . . .			83,027
Number below 50,000 . . . . .			1,220
Number 250,000 or less . . . . .			2,254
Number above 750,000 . . . . .			294
		PASTEURIZED MILK INCLUDING 87 SAMPLES OF GRADE A MILK AND 23 SAMPLES OF PASTEURIZED CERTIFIED MILK	
Total samples . . . . .			499
Lowest count . . . . .			Less than 100
Highest count . . . . .			3,900,000
Geometric mean . . . . .			14,502
Number below 50,000 . . . . .			370
Number below 100,000 . . . . .			423
Number above 50,000 . . . . .			129
		SUMMARY	
Total samples examined . . . . .			3,665
Samples complying with regulations . . . . .			3,239
Per cent of samples complying with regulations . . . . .			88.4



TABLE 5. — *Summary of Analyses of Food Samples*

CHARACTER OF SAMPLE	NOT DECLARED ADULTERATED OR MISBRANDED		TOTAL
	ADULTERATED OR MISBRANDED	MISBRANDED	
Butter . . . . .	35	22	57
Confectionery . . . . .	2	0	2
Cheese . . . . .	1	0	1
Clams . . . . .	30	28	58
Coffee . . . . .	1	0	1
Cookies and crackers . . . . .	2	0	2
Cream . . . . .	42	5	47
Dried fruits . . . . .	1	1	2
Eggs . . . . .	506	188	694
Flavoring extracts . . . . .	24	0	24
Honey . . . . .	2	0	2
Ice cream . . . . .	17	0	17
Malted Milk . . . . .	1	0	1
Maple Sugar . . . . .	8	5	13
Maple Syrup . . . . .	20	16	36
Mayonnaise . . . . .	8	1	9
Meat Products:			
Canned Meats . . . . .	2	5	7
Chicken . . . . .	3	0	3
Hamburg Steak . . . . .	157	52	209
Liver . . . . .	2	1	3
Pork . . . . .	0	1	1
Sausages . . . . .	793	76	869
Soup Stock . . . . .	0	1	1
Stew Meat . . . . .	1	0	1
Veal . . . . .	1	0	1
Milk Shake . . . . .	0	1	1
Miscellaneous . . . . .	13	2	15
Olive Oil . . . . .	6	0	6
Peanut Butter . . . . .	2	0	2
Preserved Fruits . . . . .	3	4	7
Soft Drinks . . . . .	2	0	2
Vinegar . . . . .	10	0	10
Totals . . . . .	1,695	409	2,104
Metal Polish . . . . .	36	0	36
Grand Totals . . . . .	1,731	409	2,140

TABLE 6. — *Liquor Report for 1931*  
*Character of Samples*

CITIES AND TOWNS	Beer	Cider	Wine	Distilled spirits	Extracts	Alcohol	Miscel- laneous	Total
Arlington . . . . .	7	—	15	23	2	24	—	71
Boston . . . . .	462	—	107	1,696	39	340	54	2,698
Cambridge . . . . .	110	—	5	212	2	28	7	364
Chelsea . . . . .	30	—	—	24	1	2	—	57
Everett . . . . .	29	—	5	23	—	13	—	70
Haverhill . . . . .	19	24	3	14	—	2	2	64
Hull . . . . .	7	—	2	13	—	7	—	29
Lowell . . . . .	106	—	12	115	—	18	3	254
Lynn . . . . .	21	—	7	121	—	17	—	166
Malden . . . . .	5	—	—	35	—	6	2	48
Medford . . . . .	22	—	4	19	—	13	—	58
Newton . . . . .	11	—	10	29	—	7	—	57
Peabody . . . . .	64	—	11	22	—	—	—	97
Plymouth . . . . .	14	—	4	13	—	1	—	32
Quincy . . . . .	40	—	18	26	—	30	—	114
Revere . . . . .	15	—	—	14	—	—	—	29
Salem . . . . .	37	—	1	39	—	24	—	101
Somerville . . . . .	20	—	2	29	—	9	—	60
Springfield . . . . .	129	6	30	240	1	8	—	414
Waltham . . . . .	20	—	2	12	—	12	—	46
Wareham . . . . .	5	—	2	27	—	—	—	34
Watertown . . . . .	13	—	8	29	—	1	—	51
Woburn . . . . .	9	—	—	19	—	—	—	28
Dept. Pub. Safety . . . . .	145	12	38	205	1	16	4	421
Miscellaneous <sup>1</sup> . . . . .	247	10	60	273	3	51	5	649
Totals . . . . .	1,587	52	346	3,272	49	629	77	6,012

<sup>1</sup> From 88 towns submitting less than twenty-five samples each.

TABLE 7. — *Summary of Analyses of Drugs, Chemicals and Poisons, Submitted by the Police*

CHARACTER OF SAMPLE	NUMBER OF SAMPLES
Morphine . . . . .	31
Morphine Derivatives . . . . .	4
Opium . . . . .	9
Cocaine . . . . .	1
Suspected Narcotics and none found . . . . .	3
Lobelin . . . . .	1
Methyl Alcohol . . . . .	2
Mixtures containing Methyl Alcohol . . . . .	2
Potassium Hydroxide . . . . .	2
Sodium Hydroxide . . . . .	1
Alcohol and an Oleo Resin . . . . .	1
Alcohol containing Caffeine . . . . .	1
Juniper Oil Mixture . . . . .	1
Powder containing trace of Arsenic . . . . .	1
Aluminum Phosphate . . . . .	1
Mercuric Chloride Mixture . . . . .	1
Ointments . . . . .	2
Proprietary Drug . . . . .	1
Meat examined for poison . . . . .	1
Milk containing Strychnine . . . . .	1
Examined for poison with negative results . . . . .	23
Totals . . . . .	90

TABLE 8. — *Summary of Inspections of Bakeries Made by the Division*

Number of such bakeries inspected . . . . .	752
Number of defects found as follows:	
Floors not properly constructed or maintained . . . . .	71
Walls not properly constructed or maintained . . . . .	56
Ceilings not properly constructed or maintained . . . . .	41
Storage facilities not properly constructed or maintained . . . . .	13
Apparatus not properly constructed or maintained . . . . .	55
Stock not properly protected . . . . .	32
Products not properly protected . . . . .	54
Flies abundant . . . . .	11
Flour storage not satisfactory . . . . .	18
Tobacco used in bakery . . . . .	12
Absence of garbage can . . . . .	18
Domestic rooms connected with bakery . . . . .	4
Toilets not satisfactory . . . . .	35
Animals in bakery . . . . .	25
Roaches in bakery . . . . .	1
Dirty delivery wagon . . . . .	1
Total defects . . . . .	447

*Summary of Tables 13, 14 and 15*

Requests for extension of time granted . . . . .	358
Butter . . . . .	8
Eggs . . . . .	28
Poultry . . . . .	5
Meat . . . . .	70
Fish . . . . .	247
Requests for extension of time not granted . . . . .	23
Butter . . . . .	1
Eggs . . . . .	5
Meat . . . . .	2
Fish . . . . .	15
Articles ordered removed from storage (no requests made) . . . . .	143
Butter . . . . .	4
Eggs . . . . .	14
Poultry . . . . .	17
Meat . . . . .	28
Game . . . . .	1
Fish . . . . .	79

TABLE 9. — *Articles Other than Fish placed in Cold Storage from December 1, 1930, to December 1, 1931*

	Butter (lbs.)	Eggs (Dozens)	Broken- out Eggs (lbs.)	Broilers (lbs.)	Roasters (lbs.)	Fowls (lbs.)	Turkeys (lbs.)	Miscel- laneous Poultry (lbs.)	Beef (lbs.)	Pork (lbs.)	Lamb and Mutton (lbs.)	Miscel- laneous Meats (lbs.)
December	704,165	181,830	325,870	65,116	1,099,413	358,462	505,324	300,533½	277,767½	2,189,624	144,067	1,350,930
January	564,964	147,300	160,306	113,949	639,664	478,909	365,176	256,582	260,872	7,157,092	96,953	2,040,478
February	497,321	527,100	321,646	113,659	349,846	675,922	385,477	243,393	395,114½	4,562,147½	47,852	1,558,135
March	373,505	2,042,370	963,893	76,015	474,510	226,103	103,752	91,075	423,510	2,264,117½	103,157	1,752,968
April	504,717	3,673,560	891,635	59,381	275,068	145,074	109,786	294,724	436,360	2,634,731	124,515	1,590,174
May	1,326,832	3,203,730	849,760	70,818	208,939	182,533	107,444	222,256	510,681	1,691,491	113,644	1,186,657
June	5,237,904	2,072,160	1,938,572	123,770	244,270	220,349	137,800	515,495	337,002	2,697,231	260,935	1,526,856
July	3,764,791	465,720	558,455	132,407	127,489	301,420	143,208	402,331	348,232	1,521,226	59,167	1,440,894
August	1,987,676	667,120	298,920	176,122	99,749	251,324	81,594	345,285	334,492	697,531	43,659	1,201,422
September	1,085,852	343,350	385,021	234,793	373,605	191,916	59,852	409,799	261,515	580,381	64,613	816,411
October	814,872	353,040	931,463	175,930	633,081	108,583	67,357	129,398	286,263½	702,439	147,156	871,248
November	668,704	194,310	323,347	105,404	873,356	84,256	539,212	364,273	483,560	1,060,076½	154,106	1,014,664

TABLE 10. — *Articles Other than Fish on Hand in Cold Storage on the First Day of the Month, from January 1, 1931, through December 1, 1931*

	Butter (lbs.)	Eggs (Dozens)	Broken- out Eggs (lbs.)	Broilers (lbs.)	Roasters (lbs.)	Fowls (lbs.)	Turkeys (lbs.)	Miscel- laneous Poultry (lbs.)	Beef (lbs.)	Pork (lbs.)	Lamb and Mutton (lbs.)	Miscel- laneous Meats (lbs.)
January	5,356,975	834,630	1,691,423	599,457	1,909,118	631,458	265,327	1,209,052	2,501,906	2,635,467½	770,272	2,771,515
February	3,960,326	145,440	1,282,919½	565,407	2,217,323	993,354	557,215	1,189,538	2,266,724	9,038,200	648,587	3,596,754
March	2,698,405	458,400	1,079,081½	556,186	2,018,689	1,567,108	819,628	1,160,271	2,128,512½	12,811,377½	541,345	3,381,241
April	1,347,794	2,172,870	1,471,571½	474,159	1,819,958	1,483,424	623,394	790,095	2,112,590	12,665,898	480,949	3,606,299
May	1,049,797	5,551,770	1,862,704	362,736	1,372,411	1,064,843	484,003	514,048	2,037,862	11,603,961½	397,128	2,970,774
June	1,856,189	8,551,170	2,166,999	305,747	914,761	892,715	425,078½	533,358	2,252,991	10,497,988½	397,128	2,885,579
July	6,483,200	10,170,420	3,347,228	307,157	515,361	772,671	398,098½	866,100	2,252,991	9,082,833½	550,533½	3,606,299
August	9,352,995	9,902,400	3,275,278	338,113	153,261	704,625	405,151½	1,098,241	1,791,338	7,047,263	360,228	2,355,204
September	9,514,620	9,069,980	2,932,773	424,301	100,011	573,667	347,504½	1,205,086	1,638,226	3,262,156	274,447	2,163,295
October	7,708,099	7,373,360	2,694,270	605,433	357,660	489,885	300,465	1,432,751	1,293,849	1,760,192	261,521	1,877,673
November	5,261,199	5,261,910	2,335,431	726,181	890,642	431,057	248,177	1,367,869	1,093,348½	1,084,323½	319,005	1,085,241
December	3,374,889	2,757,750	2,003,429	693,388	1,657,185	345,614	479,889	1,290,895	889,517	1,653,767	409,290	1,351,680



TABLE 11. — *Fish placed in Cold Storage from December 15, 1930, to December 15, 1931*

	Bluefish (lbs.)	Butter- fish (lbs.)	Ciscoes (lbs.)	Cod, Hake, Pollock, and Haddock (lbs.)	Halibut (lbs.)	Herring (lbs.)	Mackerel (lbs.)	Fall and Silver Salmon (lbs.)	Salmon, all Others (lbs.)	Shad (lbs.)	Smelts, Eula- chon, etc. (lbs.)	Squid (lbs.)	White- fish (lbs.)	Whiting (lbs.)	Miscel- laneous Frozen Fish (lbs.)
January	861	524	—	639,710	189,668	92,545	14,990	74,572	8,270	61	156,074	1,716	742	563,272	230,587
February	794	3,131	190	449,719	252,731	71,650	30,625	113,892	15,576	302	196,403	29,102	20,827	—	132,935
March	1,241	2,230	—	1,733,357	54,364	35,863	30,395	40,095	55,527	550	160,088	—	35	164,800	135,567
April	2,056	495	14,278	1,033,794	8,130	—	43,790	—	75	4,825	363	150	15	—	197,225
May	877	117	2,550	917,391	13,854	899,160	4,400	13,200	12,000	671	4,929	275,452	15	94,110	234,833
June	30,654	30,654	6,850	416,144	29,926	108,095	626,688	680	24,945	2,365	1,65	685,723	15	2,755,821	339,154
July	257	98,631	880,556	683,856	76,192	112,554	2,247,763	5,766	13,349	55,612	1,950	132,737	3,613	2,160,520	245,578
August	8,821	132,745	16,620	880,730	48,870	387,311	1,391,467	7,661	13,399	174	550	83,901	1,200	617,691	344,361
September	15,236	109,145	2,065	641,751	53,320	584,246	3,995,018	9,617	18,376	2,075	1,769	108,964	350	202,461	690,731
October	5,504	5,052	10,500	773,000	10,966	545,241	438,014	12,257	7,597	20,495	345	30,361	600	530,248	757,505
November	3,210	31,889	3,523	693,307	186,722	614,379	19,386	11,941	1,532	26,834	6,942	33,323	105	592,298	793,199
December	172	3,359	10,371	993,236	271,893	312,354	59,652	97,264	5,265	3,956	54,004	629	16,960	52,675	579,331

TABLE 12. — *Fish on Hand in Cold Storage on the Fifteenth Day of the Month, from January 15, 1931, through December 15, 1931*

	Bluefish (lbs.)	Butter- fish (lbs.)	Ciscoes (lbs.)	Cod, Hake, Pollock, and Haddock (lbs.)	Halibut, (lbs.)	Herring (lbs.)	Mackerel (lbs.)	Fall and Silver Salmon (lbs.)	Salmon, all Others (lbs.)	Shad (lbs.)	Smelts, Eula- chon, etc. (lbs.)	Squid (lbs.)	White- fish (lbs.)	Whiting (lbs.)	Miscel- laneous Frozen Fish (lbs.)
January	15,464	143,589	7,052	2,318,588	391,961	1,087,164	3,120,405	140,239	114,220	41,315	136,225	1,609,029	6,038	4,692,254	3,186,028
February	10,453	97,510	3,611	1,829,353	335,641	879,529	2,063,373	157,089	91,693	25,663	253,697	1,336,705	22,466	3,766,560	2,622,984
March	5,998	18,047	531	1,143,140	111,698	686,087	946,520	103,363	85,841	22,192	295,272	899,775	16,254	3,099,521	1,956,219
April	1,123	3,483	531	1,298,470	104,709	470,914	184,578	48,595	56,421	735	143,828	514,403	1,187	2,171,574	1,367,240
May	1,315	610	2,631	1,527,778	93,156	891,420	100,467	15,954	30,678	671	114,313	615,706	63	1,897,835	1,319,599
June	559	30,098	1,281	1,448,376	113,700	526,536	685,285	11,823	51,041	2,508	102,787	1,286,972	15	4,085,236	1,352,123
July	529	126,331	7,381	1,822,177	176,457	325,434	2,909,824	16,167	51,041	57,917	102,457	1,322,413	3,082	5,863,571	1,250,023
August	8,298	258,315	21,241	2,076,926	216,972	233,768	4,265,044	11,017	71,506	49,436	101,133	1,251,461	4,006	6,057,506	1,412,413
September	21,793	362,514	11,288	2,106,234	264,102	503,276	8,189,899	22,069	86,735	30,901	99,493	1,186,376	3,551	5,678,877	1,775,214
October	24,292	363,655	14,830	1,990,592	255,464	749,964	8,430,640	25,778	92,290	46,909	96,664	1,102,495	3,933	5,667,611	2,335,375
November	23,184	373,275	12,664	1,737,005	311,494	887,869	7,425,352	29,969	84,165	52,890	97,543	1,019,398	3,579	5,427,908	2,335,375
December	18,624	337,644	18,297	1,958,756	384,574	834,877	6,709,955	75,491	68,107	46,631	105,705	813,242	18,524	4,657,443	2,496,881

TABLE 13. — *Requests for Extension of Time Granted on Goods in Cold Storage from December 1, 1930, to December 1, 1931*

[Reason for such extension being that goods were in proper condition for further storage]

ARTICLE	Weight (Pounds)	Placed in Storage	Extension Granted to —	Name
Butter . . . . .	12,800	Sept. 10, 1930	Jan. 10, 1932	Berman & Co., Inc.
Butter . . . . .	3,040	June 6, 1930	Sept. 1, 1931	Bowles Lunch, Inc.
Butter . . . . .	480	July 16, 1930	Sept. 16, 1931	Chapin & Adams Co.
Butter . . . . .	9,000	June 21, 1930	Aug. 20, 1931	Daggett Chocolate Co.
Butter . . . . .	450	June 4, 1930	July 4, 1931	Fleishman, P.
Butter . . . . .	2,113	July 30, 1930	Oct. 15, 1931	Springfield Cold Storage Co., Inc.
Butter . . . . .	693	July 7, 1930	Sept. 7, 1931	Stone Co., Chas. H.
Butter . . . . .	120	July 9, 1930	Sept. 9, 1931	Stone Co., Chas. H.
Eggs . . . . .	20,130	May —, 1930	Oct. 1, 1931	Stone Co., Chas. H.
Eggs . . . . .	1,470	May 22, 1930	June 15, 1931	Stone Co., Chas. H.
Eggs, mixed . . . . .	2,112	Apr. 1, 1930	Oct. 1, 1931	Carr & Sons, John J.
Eggs, mixed . . . . .	4,260	July 22, 1930	Dec. 30, 1931	Land O'Lakes Creamery, Inc.
Eggs, mixed . . . . .	9,548	Mar. —, 1930	July 1, 1931	Layton Co., Inc., John
Eggs, mixed . . . . .	37,080	Apr. 15, 1930	Mar. 1, 1932	National Biscuit Co.
Eggs, mixed . . . . .	6,060	Mar. —, 1930	Oct. 1, 1931	Stone Co., Chas. H.
Eggs, mixed . . . . .	690	May 19, 1930	July 1, 1931	Swift & Co.
Eggs, mixed . . . . .	630	May 22, 1930	July 1, 1931	Swift & Co.
Eggs, mixed . . . . .	6,960	June 6, 1930	Oct. 1, 1931	Swift & Co.
Egg sugary yolks . . . . .	1,700	May 20, 1930	July 20, 1931	Ovson Egg Co.
Egg whites . . . . .	186	Apr. 1, 1930	Oct. 1, 1931	Carr & Sons, John J.
Egg whites . . . . .	4,170	May —, 1930	Aug. 15, 1931	Cushman Bakery
Egg whites . . . . .	21,030	July 1, 1930	Dec. 31, 1931	First National Stores, Inc.
Egg whites . . . . .	4,929	May 20, 1930	July 20, 1930	Ovson Egg Co.
Egg whites . . . . .	3,000	May 2, 1930	Aug. 2, 1931	Standard Brands, Inc.
Egg whites . . . . .	690	May 12, 1930	Aug. 1, 1931	Stone Co., Chas. H.
Egg whites . . . . .	10,380	Mar. 5, 1930	July 1, 1931	Swift & Co.
Egg whites . . . . .	400	Apr. 11, 1930	July 1, 1931	Swift & Co.
Egg whites . . . . .	3,150	Apr. 18, 1930	July 1, 1931	Swift & Co.
Egg whites . . . . .	19,590	May 15, 1930	*Jan. 1, 1932	Swift & Co.
Eggs, whole . . . . .	1,500	May 29, 1930	Aug. 29, 1931	Standard Brands, Inc.
Egg yolks . . . . .	1,012	Mar. —, 1930	July 1, 1931	Layton Co., Inc., John
Egg yolks . . . . .	480	May 1, 1930	July 1, 1931	Layton Co., Inc., John
Egg yolks . . . . .	3,000	Apr. 23, 1930	July 23, 1931	Standard Brands, Inc.
Egg yolks . . . . .	3,060	May 3, 1930	Aug. 3, 1931	Standard Brands, Inc.
Egg yolks . . . . .	3,180	May 6, 1930	July 6, 1931	Stevens Cold Storage Co.
Egg yolks . . . . .	810	June 6, 1930	Oct. 1, 1931	Swift & Co.
Broilers . . . . .	3,936	Sept. 15, 1930	Dec. 15, 1931	Birdseye Packing Co.
Chickens . . . . .	5,904	Sept. 5, 1930	Dec. 5, 1931	Birdseye Packing Co.
Chix . . . . .	1,260	Dec. 31, 1929	Feb. 28, 1931	Childs, Sleeper & Co.
Chix . . . . .	313½	Dec. 20, 1929	Apr. 5, 1931	Reformatory for Women
Roosters . . . . .	16,866	July 21, 1930	Oct. 21, 1931	Thompson's Spa, Inc.
Beef . . . . .	1,000	July 2, 1930	Sept. 2, 1931	Davenport, Wm. A.
Beef . . . . .	1,200	Apr. 14, 1930	*Oct. 1, 1931	Kurland, David
Beef . . . . .	1,500	Apr. 18, 1930	*Oct. 1, 1931	Kurland, David
Beef . . . . .	11,025	Nov. 3, 1930	Mar. 1, 1932	New England Dressed Meat & Wool Co.
Beef . . . . .	11,746	Nov. 14, 1930	Mar. 1, 1932	New England Dressed Meat & Wool Co.
Beef . . . . .	20,000	Apr. 8, 1930	July 8, 1931	United Beef Co.
Beef . . . . .	21,333	June 20, 1930	*Dec. 20, 1931	United Beef Co.
Beef . . . . .	21,334	June 20, 1930	*Dec. 20, 1931	United Beef Co.
Beef . . . . .	21,333	June 20, 1930	*Dec. 20, 1931	United Beef Co.
Beef buttocks . . . . .	14,153	Oct. 29, 1929	June 9, 1931	New England Dressed Meat & Wool Co.
Beef chucks . . . . .	1,033	June 14, 1930	Aug. 14, 1931	Goodenough & Russell
Beef clods . . . . .	11,757	Oct. 29, 1929	June 9, 1931	New England Dressed Meat & Wool Co.
Beef clods . . . . .	10,095	Oct. 29, 1929	June 9, 1931	New England Dressed Meat & Wool Co.
Beef clods . . . . .	21,761	Dec. 16, 1929	June 16, 1931	New England Dressed Meat & Wool Co.
Beef fores . . . . .	6,482	Nov. 4, 1930	Mar. 1, 1932	New England Dressed Meat & Wool Co.
Beef fores . . . . .	4,149	Nov. 5, 1930	Mar. 1, 1932	New England Dressed Meat & Wool Co.
Beef hinds . . . . .	6,024	Nov. 4, 1930	Mar. 1, 1932	New England Dressed Meat & Wool Co.
Beef hinds . . . . .	4,451	Nov. 5, 1930	Mar. 1, 1932	New England Dressed Meat & Wool Co.
Beef livers . . . . .	4,918	Aug. 23, 1930	Nov. 23, 1931	New England Dressed Meat & Wool Co.
Beef loins . . . . .	6,348	June 4, 1930	Sept. 2, 1931	Batchelder, Snyder, Dorr & Doe Co.
Beef loins . . . . .	2,849	June 4, 1930	Sept. 2, 1931	Batchelder, Snyder, Dorr & Doe Co.
Beef loins . . . . .	13,645	June 4, 1930	Sept. 2, 1931	Batchelder, Snyder, Dorr & Doe Co.
Beef loins . . . . .	936	June 4, 1930	Sept. 2, 1931	Batchelder, Snyder, Dorr & Doe Co.
Beef loins . . . . .	21,026	June 4, 1930	Sept. 2, 1931	Batchelder, Snyder, Dorr & Doe Co.
Beef (sirloin roasts) . . . . .	5,317	Oct. 19, 1930	Jan. 19, 1932	Birdseye Packing Co., Inc.
Beef tongues . . . . .	337	Dec. 10, 1929	Feb. 10, 1931	New England Dressed Meat & Wool Co.

TABLE 13. — *Requests for Extension of Time Granted on Goods in Cold Storage from December 1, 1930, to December 1, 1931 — Continued*

ARTICLE	Weight (Pounds)	Placed in Storage	Extension Granted to —	Name
Beef trimmings . . . . .	1,240	Apr. 24, 1930	*Oct. 1, 1931	Kurland, David
Beef trimmings . . . . .	3,282	Apr. 26, 1930	*Oct. 1, 1931	Kurland, David
Beef trimmings . . . . .	1,733	May 20, 1930	*Oct. 1, 1931	Kurland, David
Beef trimmings . . . . .	1,200	May 29, 1930	*Oct. 1, 1931	Kurland, David
Bull meat . . . . .	100,791	May 5, 1930	*Oct. 2, 1931	Liberty Beef Co.
Bull meat . . . . .	67,340	Apr. 5, 1930	*Oct. 2, 1931	Liberty Beef Co.
Calf livers . . . . .	430	June 13, 1930	Sept. 5, 1931	Batchelder, Snyder, Dorr & Doe Co.
Hamburg steak . . . . .	10,000	Sept. 16, 1930	Dec. 16, 1931	Birdseye Packing Co., Inc.
Lamb . . . . .	1,897	Dec. 20, 1929	May 1, 1931	Armour & Co.
Lamb . . . . .	2,239	Dec. 30, 1929	May 1, 1931	Armour & Co.
Lamb . . . . .	3,410	Dec. 28, 1929	May 1, 1931	Armour & Co.
Lamb . . . . .	11,168	Dec. 28, 1929	May 1, 1931	Armour & Co.
Lamb . . . . .	2,551	Feb. 13, 1930	May 1, 1931	Armour & Co.
Lamb . . . . .	1,831	Feb. 13, 1930	May 1, 1931	Armour & Co.
Lamb bridles . . . . .	3,603	Mar. 8, 1930	*July 15, 1931	Stolar, R.
Lamb bridles . . . . .	420	Mar. 11, 1930	July 15, 1931	Stolar, R.
Lamb bridles . . . . .	1,185	Mar. 14, 1930	July 15, 1931	Stolar, R.
Lamb bridles . . . . .	2,254	Mar. 24, 1930	*July 15, 1931	Stolar, R.
Lamb chops . . . . .	1,500	Sept. 4, 1930	Dec. 4, 1931	Birdseye Packing Co., Inc.
Lamb chops . . . . .	5,000	Oct. 20, 1930	Jan. 20, 1932	Birdseye Packing Co., Inc.
Lamb chops . . . . .	710	June 14, 1930	Aug. 14, 1931	Goodenough & Russell
Lamb fores . . . . .	1,545	Mar. 8, 1930	*July 15, 1931	Stolar, R.
Lamb kidneys . . . . .	159	June 3, 1930	Sept. 3, 1931	Batchelder, Snyder, Dorr & Doe Co.
Lamb kidneys . . . . .	59	June 13, 1930	Sept. 11, 1931	Batchelder, Snyder, Dorr & Doe Co.
Lamb legs . . . . .	680	Dec. 28, 1929	Feb. 28, 1931	Childs, Sleeper & Co.
Lamb racks . . . . .	220	June 13, 1930	Sept. 5, 1931	Batchelder, Snyder, Dorr & Doe Co.
Lamb roasts . . . . .	3,213	Dec. 3, 1930	Mar. 2, 1932	Birdseye Packing Co., Inc.
Mutton . . . . .	2,543	June 26, 1930	Sept. 22, 1931	Batchelder, Snyder, Dorr & Doe Co.
Mutton . . . . .	1,477	June 30, 1930	Aug. 30, 1931	Goodenough & Russell
Sheep plucks . . . . .	9,701	Dec. 9, 1929	Mar. 9, 1931	New England Dressed Meat & Wool Co.
Sheep plucks . . . . .	1,354	Dec. 10, 1929	Mar. 10, 1931	New England Dressed Meat & Wool Co.
Sheep plucks . . . . .	2,680	Dec. 10, 1929	Mar. 10, 1931	New England Dressed Meat & Wool Co.
Pork chops . . . . .	8,100	Sept. 17, 1930	Dec. 17, 1931	Birdseye Packing Co., Inc.
Pork chops . . . . .	3,750	Nov. 5, 1930	Feb. 5, 1932	Birdseye Packing Co., Inc.
Pork hearts . . . . .	8,000	Dec. 10, 1929	Feb. 25, 1931	Essens Packing Co.
Spare ribs . . . . .	6,031	Aug. 27, 1930	Nov. 26, 1931	Mades Co., Inc., M. M.
Sweetbreads . . . . .	600	May 5, 1930	July 3, 1931	Bohn & Kent Co.
Sweetbreads . . . . .	338	July 16, 1930	Dec. 16, 1931	Richards Co., Inc., Albert
Sweetbreads . . . . .	144	July 16, 1930	Dec. 16, 1931	Richards Co., Inc., Albert
Veal kidneys . . . . .	63	June 3, 1930	Sept. 3, 1931	Batchelder, Snyder, Dorr & Doe Co.
Veal kidneys . . . . .	66	June 13, 1930	Sept. 11, 1931	Batchelder, Snyder, Dorr & Doe Co.
Veal kidneys . . . . .	71	June 29, 1930	Sept. 22, 1931	Batchelder, Snyder, Dorr & Doe Co.
Veal legs . . . . .	1,001	June 29, 1930	Sept. 22, 1931	Batchelder, Snyder, Dorr & Doe Co.
Veal sweetbreads . . . . .	530	Oct. 4, 1930	Jan. 1, 1932	New England Dressed Meat & Wool Co.
Catfish . . . . .	540	Sept. 5, 1930	Nov. 5, 1931	Atlas Fish Co.
Catfish filets . . . . .	360	June 27, 1930	Oct. 27, 1931	Atlas Fish Co.
Cod filets . . . . .	140	Sept. 19, 1930	Dec. 19, 1931	Atlas Fish Co.
Cod filets . . . . .	2,800	June 25, 1930	Aug. 25, 1931	Beacon Fisheries Co.
Cod filets . . . . .	15,955	Aug. 7, 1930	*Jan. 15, 1932	Beacon Fisheries Co.
Cod filets . . . . .	4,035	Aug. 8, 1930	Nov. 1, 1931	Beacon Fisheries Co.
Cod filets . . . . .	5,670	July 9, 1930	Dec. 31, 1931	Boston Bay Fillet Co.
Cod filets . . . . .	1,680	July 11, 1930	Dec. 31, 1931	Boston Bay Fillet Co.
Cod filets . . . . .	11,025	July 11, 1930	Dec. 31, 1931	Boston Bay Fillet Co.
Cod filets . . . . .	7,335	July 14, 1930	Dec. 31, 1931	Boston Bay Fillet Co.
Cod filets . . . . .	23,925	July 15, 1930	Dec. 31, 1931	Boston Bay Fillet Co.
Cod filets . . . . .	3,960	July 15, 1930	Dec. 31, 1931	Boston Bay Fillet Co.
Cod filets . . . . .	24,000	July 16, 1930	Dec. 31, 1931	Boston Bay Fillet Co.
Cod filets . . . . .	3,735	July 17, 1930	Dec. 31, 1931	Boston Bay Fillet Co.
Cod filets . . . . .	20,265	July 19, 1930	Dec. 31, 1931	Boston Bay Fillet Co.
Cod filets . . . . .	90	July 18, 1930	Dec. 18, 1931	Burns McKeon Co.
Cod filets . . . . .	795	Sept. 11, 1930	Mar. 11, 1932	Burns McKeon Co.
Cod filets . . . . .	375	Sept. 12, 1930	Mar. 12, 1932	Burns McKeon Co.
Cod filets . . . . .	495	Sept. 13, 1930	Mar. 13, 1932	Burns McKeon Co.
Cod filets . . . . .	1,170	Sept. 19, 1930	Mar. 19, 1932	Burns McKeon Co.
Cod filets . . . . .	225	Sept. 23, 1930	Mar. 23, 1932	Burns McKeon Co.
Cod filets . . . . .	2,700	Nov. 21, 1930	Feb. 1, 1932	Burns McKeon Co.
Cod filets . . . . .	180	Nov. 22, 1930	Feb. 1, 1932	Burns McKeon Co.
Cod filets . . . . .	1,020	Nov. 6, 1930	Feb. 1, 1932	Coleman Son Co.
Cod filets . . . . .	420	June 17, 1930	Oct. 17, 1931	Commonwealth Fish Co.
Cod filets . . . . .	5,100	June 27, 1930	Oct. 27, 1931	Commonwealth Fish Co.
Cod filets . . . . .	2,310	Aug. 3, 1930	Dec. 31, 1931	Commonwealth Ice & Cold Storage Co.



TABLE 13. — *Requests for Extension of Time Granted on Goods in Cold Storage from December 1, 1930, to December 1, 1931 — Continued*

ARTICLE	Weight (Pounds)	Placed in Storage	Extension Granted to —	Name
Cod filets . . . . .	5,115	Aug. 6, 1930	Dec. 31, 1931	Commonwealth Ice & Cold Storage Co.
Cod filets . . . . .	30	Oct. 24, 1930	Dec. 31, 1931	Commonwealth Ice & Cold Storage Co.
Cod filets . . . . .	7,065	Aug. 9, 1930	Dec. 9, 1931	Russo, Jr., Anthony
Cod filets . . . . .	4,470	July 23, 1930	Dec. 23, 1931	Russo & Sons Co.
Cod filets, skinned . . . . .	1,290	July 11, 1930	Dec. 30, 1931	Commonwealth Fish Co
Cod steak . . . . .	2,000	Dec. 31, 1930	Mar. 1, 1932	Burns McKeon Co.
Eels . . . . .	816	Sept. 30, 1930	Mar. 30, 1932	Atwood & Co.
Eels . . . . .	425	May 2, 1930	Dec. 1, 1931	Tribuna Magri Co.
Eels . . . . .	245	May 3, 1930	Dec. 1, 1931	Tribuna Magri Co.
Eels . . . . .	420	May 27, 1930	Dec. 1, 1931	Tribuna Magri Co.
Eels, large . . . . .	3,850	Oct. 31, 1930	Jan. 31, 1932	Dench & Hardy
Eels, small . . . . .	130	Nov. 17, 1930	Dec. 17, 1931	Covino, Joseph
Eels, small . . . . .	230	July 1, 1930	Dec. 31, 1931	Tribuna Magri Co.
Eels, small . . . . .	415	July 25, 1930	Dec. 31, 1931	Tribuna Magri Co.
Eels, small . . . . .	435	July 31, 1930	Dec. 31, 1931	Tribuna Magri Co.
Eels, small . . . . .	300	Sept. 25, 1930	Mar. 25, 1932	Tribuna Magri Co.
Flounder filets . . . . .	390	Nov. 10, 1930	Jan. 15, 1932	Beacon Fisheries Co.
Flounder filets . . . . .	690	Nov. 13, 1930	Jan. 15, 1932	Beacon Fisheries Co.
Flounder filets . . . . .	2,010	Nov. 20, 1930	Jan. 15, 1932	Beacon Fisheries Co.
Fresh fish . . . . .	975	Sept. 3, 1930	Mar. 3, 1932	Collins-Lee Co.
Fresh fish . . . . .	25	Sept. 4, 1930	Mar. 4, 1932	Collins-Lee Co.
Fresh fish . . . . .	1,200	Sept. 5, 1930	Mar. 5, 1932	Collins-Lee Co.
Haddock filets . . . . .	24,000	Sept. 9, 1930	*Feb. 1, 1932	Batchelder, Snyder, Dorr & Doe Co.
Haddock filets . . . . .	12,900	Oct. 6, 1930	Jan. 6, 1932	Batchelder, Snyder, Dorr & Doe Co.
Haddock filets . . . . .	975	Aug. 9, 1930	Dec. 31, 1931	Bay State Fillet Co.
Haddock filets . . . . .	2,520	Sept. 10, 1930	Dec. 1, 1931	Bay State Fishing Co.
Haddock filets . . . . .	4,710	Apr. 17, 1930	July 17, 1931	Beacon Fisheries Co.
Haddock filets . . . . .	7,725	June 12, 1930	Oct. 12, 1931	Beacon Fisheries Co.
Haddock filets . . . . .	8,770	Aug. 14, 1930	Nov. 1, 1931	Beacon Fisheries Co.
Haddock filets . . . . .	3,735	Aug. 18, 1930	Nov. 1, 1931	Beacon Fisheries Co.
Haddock filets . . . . .	16,710	Aug. 20, 1930	Nov. 1, 1931	Beacon Fisheries Co.
Haddock filets . . . . .	1,200	Aug. 22, 1930	Nov. 1, 1931	Beacon Fisheries Co.
Haddock filets . . . . .	6,450	Aug. 23, 1930	Nov. 1, 1931	Beacon Fisheries Co.
Haddock filets . . . . .	2,070	Aug. 28, 1930	Nov. 1, 1931	Beacon Fisheries Co.
Haddock filets . . . . .	1,185	Sept. 4, 1930	Dec. 15, 1931	Beacon Fisheries Co.
Haddock filets . . . . .	3,420	Sept. 19, 1930	Jan. 1, 1932	Beacon Fisheries Co.
Haddock filets . . . . .	4,950	Sept. 25, 1930	Dec. 15, 1931	Beacon Fisheries Co.
Haddock filets . . . . .	180	Oct. 8, 1930	Jan. 1, 1932	Beacon Fisheries Co.
Haddock filets . . . . .	2,115	July 9, 1930	Dec. 31, 1931	Boston Bay Fillet Co.
Haddock filets . . . . .	1,230	July 10, 1930	Dec. 31, 1931	Boston Bay Fillet Co.
Haddock filets . . . . .	585	Nov. 15, 1930	Feb. 15, 1932	Burns McKeon Co.
Haddock filets . . . . .	870	Nov. 19, 1930	Feb. 15, 1932	Burns McKeon Co.
Haddock filets . . . . .	1,455	Nov. 20, 1930	Feb. 15, 1932	Burns McKeon Co.
Haddock filets . . . . .	405	Dec. 24, 1930	Mar. 1, 1932	Burns McKeon Co.
Haddock filets . . . . .	150	May 24, 1930	Nov. 30, 1931	Coleman Son Co.
Haddock filets . . . . .	210	May 28, 1930	Nov. 30, 1931	Coleman Son Co.
Haddock filets . . . . .	420	June 28, 1930	Dec. 1, 1931	Coleman Son Co.
Haddock filets . . . . .	240	Aug. 2, 1930	Dec. 31, 1931	Coleman Son Co.
Haddock filets . . . . .	270	Aug. 8, 1930	Dec. 31, 1931	Coleman Son Co.
Haddock filets . . . . .	450	Nov. 18, 1930	Feb. 1, 1932	Coleman Son Co.
Haddock filets . . . . .	420	Dec. 6, 1930	Mar. 1, 1932	Coleman Son Co.
Haddock filets . . . . .	900	Feb. 25, 1930	Apr. 25, 1931	Collins-Lee Co.
Haddock filets . . . . .	120	Oct. 24, 1930	Jan. 24, 1932	Collins-Lee Co.
Haddock filets . . . . .	90	Nov. 18, 1930	Feb. 1, 1932	Collins-Lee Co.
Haddock filets . . . . .	690	Nov. 24, 1930	Feb. 1, 1932	Collins-Lee Co.
Haddock filets . . . . .	5,190	June 30, 1930	Oct. 30, 1931	Commonwealth Fish Co.
Haddock filets . . . . .	2,895	July 21, 1930	Dec. 31, 1931	Commonwealth Ice & Cold Storage Co.
Haddock filets . . . . .	1,860	Aug. 2, 1930	Dec. 31, 1931	Commonwealth Ice & Cold Storage Co.
Haddock filets . . . . .	350	Sept. 29, 1930	Dec. 31, 1931	Commonwealth Ice & Cold Storage Co.
Haddock filets . . . . .	2,700	Oct. 18, 1930	Dec. 31, 1931	Commonwealth Ice & Cold Storage Co.
Haddock filets . . . . .	2,760	Nov. 18, 1930	Feb. 18, 1932	Commonwealth Ice & Cold Storage Co.
Haddock filets . . . . .	12,260	July 21, 1930	Sept. 21, 1931	General Seafoods Corp.
Haddock filets . . . . .	10,900	July 24, 1930	Sept. 21, 1931	General Seafoods Corp.
Haddock filets . . . . .	9,080	Aug. 4, 1930	Nov. 4, 1931	General Seafoods Corp.
Haddock filets . . . . .	27,820	Aug. 4, 1930	Nov. 4, 1931	General Seafoods Corp.
Haddock filets . . . . .	5,580	Aug. 4, 1930	Nov. 4, 1931	General Seafoods Corp.
Haddock filets . . . . .	24,000	Sept. 10, 1930	Jan. 10, 1932	General Seafoods Corp.
Haddock filets . . . . .	31,920	Sept. 10, 1930	Jan. 10, 1932	General Seafoods Corp.
Haddock filets . . . . .	4,740	Sept. 18, 1930	Jan. 18, 1932	General Seafoods Corp.
Haddock filets . . . . .	19,640	Sept. 18, 1930	Jan. 18, 1932	General Seafoods Corp.
Haddock filets . . . . .	10,000	June —, 1930	Oct. 1, 1931	Gorton-Pew Fisheries Co., Ltd.
Haddock filets . . . . .	10,000	July 1, 1930	Oct. 1, 1931	Gorton-Pew Fisheries Co., Ltd.
Haddock filets . . . . .	100,000	Oct. —, 1930	Apr. 1, 1931	Gorton-Pew Fisheries Co., Ltd.
Haddock filets . . . . .	1,653	May 3, 1930	Aug. 3, 1931	Harding Co., F. E.
Haddock filets . . . . .	1,530	May 17, 1930	Aug. 17, 1931	Harding Co., F. E.
Haddock filets . . . . .	1,500	May 17, 1930	Aug. 17, 1931	Harding Co., F. E.

TABLE 13. — *Requests for Extension of Time Granted on Goods in Cold Storage from December 1, 1930, to December 1, 1931 — Continued*

ARTICLE	Weight (Pounds)	Placed in Storage	Extension Granted to —	Name
Haddock fillets	4,080	July 23, 1930	Dec. 23, 1931	Russo & Sons Co.
Haddock fillets	3,180	Aug. 4, 1930	Dec. 4, 1931	Russo & Sons Co.
Haddock fillets	1,180	June 7, 1930	Sept. 1, 1931	Whitman, Ward & Lee Co.
Haddock fillets	1,160	Sept. 15, 1930	Dec. 15, 1931	Whitman, Ward & Lee Co.
Hake fillets	220	Oct. 24, 1930	Dec. 24, 1931	Atlas Fish Co.
Hake fillets	345	Oct. 31, 1930	Feb. 1, 1932	Burns McKeon Co.
Hake fillets	450	Nov. 1, 1930	Feb. 1, 1932	Burns McKeon Co.
Hake fillets	3,750	July 1, 1930	Dec. 31, 1931	Boston Bay Fillet Co.
Hake fillets	1,325	July 2, 1930	Dec. 31, 1931	Boston Bay Fillet Co.
Hake fillets	2,400	July 2, 1930	Dec. 31, 1931	Boston Bay Fillet Co.
Hake fillets	750	July 3, 1930	Dec. 31, 1931	Boston Bay Fillet Co.
Hake fillets	8,640	Dec. 19, 1929	Mar. 19, 1931	Boston Bay Fish Co., Inc.
Hake fillets	2,620	July 10, 1930	Oct. 1, 1931	General Seafoods Corp.
Hake fillets	4,200	Sept. 8, 1930	Jan. 1, 1932	Pier Fish Co.
Hake fillets	870	Sept. 9, 1930	Jan. 1, 1932	Pier Fish Co.
Hake fillets	4,620	Sept. 12, 1930	Jan. 1, 1932	Pier Fish Co.
Hake fillets	720	Sept. 13, 1930	Jan. 1, 1932	Pier Fish Co.
Hake fillets	1,170	Sept. 19, 1930	Jan. 1, 1932	Pier Fish Co.
Hake fillets	510	Sept. 22, 1930	Jan. 1, 1932	Pier Fish Co.
Hake fillets	1,350	Sept. 22, 1930	Jan. 1, 1932	Pier Fish Co.
Hake fillets	6,390	Sept. 26, 1930	Jan. 1, 1932	Pier Fish Co.
Hake fillets	1,350	Sept. 27, 1930	Jan. 1, 1932	Pier Fish Co.
Hake fillets	2,070	Oct. 3, 1930	Feb. 1, 1932	Pier Fish Co.
Hake fillets	1,800	Oct. 4, 1930	Feb. 1, 1932	Pier Fish Co.
Halibut	385	May 8, 1930	Jan. 26, 1932	Boston Fish Co.
Halibut	200	Sept. 12, 1930	Mar. 12, 1932	Burns McKeon Co.
Halibut	2,700	Oct. 23, 1930	Feb. 1, 1932	Burns McKeon Co.
Halibut	512	June 5, 1930	Dec. 1, 1931	Coleman Son Co.
Halibut	2,000	Sept. 10, 1930	Dec. 10, 1931	New England Fish Co.
Halibut	5,250	Oct. 5, 1930	Feb. 1, 1932	O'Hara Bros. Co.
Halibut	3,800	Oct. 5, 1930	Feb. 1, 1932	O'Hara Bros. Co.
Halibut	2,800	Oct. 10, 1930	Feb. —, 1932	O'Hara Bros. Co.
Halibut	2,500	Oct. 28, 1930	Feb. 1, 1932	Pier Fish Co.
Herring, sardine	1,275	Nov. 21, 1930	Jan. 1, 1932	Covino, Joseph
Herring, sardine	2,190	Nov. 24, 1930	Jan. 1, 1932	Covino, Joseph
Herring, sardine	870	Nov. 24, 1930	Jan. 1, 1932	Covino, Joseph
Herring, sardine	1,530	Nov. 26, 1930	Jan. 1, 1932	Covino, Joseph
Herring, sardine	570	Nov. 26, 1930	Jan. 1, 1932	Covino, Joseph
Herring, sardine	6,810	Nov. 28, 1930	Jan. 1, 1932	Covino, Joseph
Herring, sardine	5,190	Nov. 29, 1930	Jan. 1, 1932	Covino, Joseph
Herring	1,600	Sept. 10, 1930	Dec. 10, 1931	Whitman, Ward & Lee Co.
Mackerel	300	Sept. 23, 1930	Nov. 23, 1931	Cann's Sea Grill
Mackerel	1,050	July 21, 1930	Dec. 21, 1931	Snow & Parker
Mackerel, Bullseye	**52,220	Sept. —, 1930	Apr. 1, 1932	Gorton-Pew Fisheries Co., Ltd
Mullet	1,200	Oct. 14, 1930	Jan. 14, 1932	Busalacchi, T. & J.
Mullet	2,653	Oct. 14, 1930	Jan. 14, 1932	Mantia, Joseph
Pollock fillets	2,160	Jan. 8, 1930	Apr. 8, 1931	Boston Bay Fillet Co.
Pollock fillets	8,190	Dec. 12, 1929	Apr. 1, 1931	Boston Bay Fillet Co.
Pollock fillets	12,000	Dec. 13, 1929	Apr. 1, 1931	Boston Bay Fillet Co.
Pollock fillets	5,250	Jan. 13, 1930	Apr. 13, 1931	Boston Bay Fillet Co.
Pollock fillets	10,440	Jan. 15, 1930	Apr. 15, 1931	Boston Bay Fillet Co.
Pollock fillets	4,410	Jan. 16, 1930	Apr. 16, 1931	Boston Bay Fillet Co.
Pollock fillets	6,270	Dec. 16, 1930	Apr. 1, 1931	Boston Bay Fillet Co.
Pollock fillets	1,890	Dec. 16, 1930	Apr. 1, 1931	Boston Bay Fillet Co.
Pollock fillets	390	May 22, 1930	Nov. 30, 1931	Coleman Son Co.
Pollock fillets	180	May 28, 1930	Nov. 30, 1931	Coleman Son Co.
Salmon	559	Oct. 30, 1930	Feb. 1, 1932	Burns McKeon Co.
Salmon	11,100	Oct. 24, 1930	Jan. 24, 1932	New England Fish Co.
Salmon	1,200	Oct. 27, 1930	Feb. 1, 1932	Pier Fish Co.
Salmon	1,872	Oct. 27, 1930	Feb. 1, 1932	Pier Fish Co.
Salmon	540	Dec. 2, 1929	Feb. 2, 1931	Pier Fish Co.
Salmon, Dr. King	490	July 21, 1930	Dec. 31, 1931	Coleman Son Co.
Salmon, King	1,259	Sept. 25, 1930	Dec. 25, 1931	Whitman, Ward & Lee Co.
Scallops	160	Apr. 17, 1930	June 17, 1931	Atlas Fish Co.
Scallops	224	Apr. 17, 1930	June 17, 1931	Atlas Fish Co.
Scallops	207	July 5, 1930	Sept. 5, 1931	Burns McKeon Co.
Scallops	1,125	Oct. 8, 1930	Jan. 15, 1932	Eldridge & Son, L. S.
Scallops	3,420	Oct. 27, 1930	Jan. 15, 1932	Eldridge & Son, L. S.
Scallops	4,582	Aug. 7, 1930	Nov. 7, 1931	Hathaway, John M.
Scallops	230	July 21, 1930	Sept. 21, 1931	Ocean Fish Corp.
Scallops	1,098	May 12, 1930	Aug. 12, 1931	Russo & Sons Co.
Scallops	7,328	July 28, 1930	Nov. 28, 1931	Whitney, S. P.
Scallops, sea	4,650	July 29, 1930	Nov. 29, 1931	Bain, Arthur A.
Scallops, sea	3,320	Aug. 6, 1930	Dec. 6, 1931	Bain, Arthur A.
Scallops, sea	3,160	Aug. 11, 1930	Dec. 6, 1931	Bain, Arthur A.
Scallops, sea	4,180	Aug. 19, 1930	Dec. 6, 1931	Bain, Arthur A.
Scallops, sea	6,450	Sept. 10, 1930	Dec. 6, 1931	Bain, Arthur A.
Scallops, sea	112	Sept. 6, 1930	Mar. 6, 1932	Burns McKeon Co.
Scallops, sea	152	Nov. 5, 1930	Feb. 1, 1932	Burns McKeon Co.
Scallops, sea	120	Nov. 8, 1930	Feb. 1, 1932	Burns McKeon Co.
Scallops, sea	6,345	Aug. 13, 1930	Feb. 13, 1932	Eldridge & Son, L. S.
Scallops, sea	2,115	Sept. 11, 1930	Jan. 15, 1932	Eldridge & Son, L. S.
Scallops, sea	2,520	Sept. 12, 1930	Jan. 15, 1932	Eldridge & Son, L. S.
Scallops, sea	5,400	Sept. 15, 1930	Jan. 15, 1932	Eldridge & Son, L. S.
Scallops, sea	90	Sept. 19, 1930	Jan. 15, 1932	Eldridge & Son, L. S.
Scallops, sea	2,025	Sept. 20, 1930	Jan. 15, 1932	Eldridge & Son, L. S.
Scallops, sea	1,665	Sept. 23, 1930	Jan. 15, 1932	Eldridge & Son, L. S.
Scallops, sea	3,015	Sept. 23, 1930	Jan. 15, 1932	Eldridge & Son, L. S.



TABLE 13. — *Requests for Extension of Time Granted on Goods in Cold Storage from December 1, 1930, to December 1, 1931 — Concluded*

ARTICLE	Weight (Pounds)	Placed in Storage	Extension Granted to —	Name
Scallops, sea	3,120	July 28, 1930	Jan. 28, 1932	Silver Shell-Fish Co.
Scallops, sea	4,080	Sept. 11, 1930	Jan. 28, 1932	Silver Shell-Fish Co.
Scallops, sea	2,430	July 16, 1930	Feb. 1, 1932	Thornby Service Lunch, Inc.
Scup	4,000	Aug. 18, 1930	Dec. 31, 1931	Dench & Hardy Co.
Scup	4,200	June 23, 1930	Dec. 23, 1931	Mantia & Co., S.
Scup	500	June 23, 1930	Dec. 1, 1931	Seaconnet River Fishing Co.
Scup	2,000	June 19, 1930	Dec. 31, 1931	Tocco, Joe
Scup	303	May 5, 1930	Dec. 1, 1931	Tribuna Magri Co.
Shark	54	Sept. 30, 1930	Feb. 1, 1932	Tribuna Magri Co.
Shark	1,744	Oct. 9, 1930	Feb. 1, 1932	Tribuna Magri Co.
Shark	120	Oct. 10, 1930	Feb. 1, 1932	Tribuna Magri Co.
Shark	275	Nov. 20, 1930	May 20, 1932	Tribuna Magri Co.
Shark	210	Nov. 22, 1930	May 22, 1932	Tribuna Magri Co.
Sole, lemon	2,190	Nov. 6, 1930	Jan. 15, 1932	Beacon Fisheries Co.
Sole, lemon	300	Nov. 6, 1930	Jan. 15, 1932	Beacon Fisheries Co.
Sole, lemon	420	Nov. 6, 1930	Jan. 15, 1932	Beacon Fisheries Co.
Sole, lemon	2,700	May 14, 1930	Nov. 14, 1931	Burns McKeon Co.
Sole, lemon	1,835	May 27, 1930	Nov. 27, 1931	Burns McKeon Co.
Sole, lemon	1,468	Sept. 15, 1930	Mar. 15, 1932	Burns McKeon Co.
Sole, lemon	5,000	Sept. 16, 1930	Mar. 16, 1932	Burns McKeon Co.
Sole, lemon	11,700	Oct. 28, 1930	Dec. 28, 1931	Hunt Co., Cassius
Sole fillets	960	Aug. 6, 1930	*Jan. 15, 1932	Beacon Fisheries Co.
Sole fillets, lemon	330	Nov. 10, 1930	Jan. 15, 1932	Beacon Fisheries Co.
Sole fillets, lemon	2,000	June —, 1930	Dec. 1, 1931	Gorton-Pew Fisheries Co., Ltd.
Squid	8,650	May 29, 1930	Nov. 29, 1931	Mantia & Co., S.
Squid	18,660	June 6, 1930	Dec. 5, 1931	Mantia & Co., S.
Squid	6,570	June 18, 1930	Dec. 18, 1931	Mantia & Co., S.
Squid	34,330	Apr. 30, 1930	Sept. 30, 1931	Russo & Sons Co.
Squid	33,510	May 2, 1930	Oct. 2, 1931	Russo & Sons Co.
Squid	15,420	May 3, 1930	Oct. 3, 1931	Russo & Sons Co.
Squid	34,740	May 3, 1930	*Dec. 3, 1931	Russo & Sons Co.
Squid	6,767	May 1, 1930	Nov. 1, 1931	Tribuna Magri Co.
Squid	4,512	May 1, 1930	Nov. 1, 1931	Tribuna Magri Co.
Squid, bone	4,736	May 19, 1930	Nov. 1, 1931	Brunswick, Robert
Squid, bone	2,612	May 1, 1930	Nov. 1, 1931	Busalacchi, Inc., T. & J.
Squid, bone	1,680	May 5, 1930	Nov. 6, 1931	Busalacchi, Inc., T. & J.
Squid, bone	1,800	May 6, 1930	Nov. 6, 1931	Busalacchi, Inc., T. & J.
Squid, bone	3,500	May 8, 1930	Nov. 8, 1931	Busalacchi, Inc., T. & J.
Squid, bone	10,800	May 9, 1930	Nov. 9, 1931	Busalacchi, Inc., T. & J.
Squid, bone	14,600	May 20, 1930	*Feb. 21, 1932	Busalacchi, Inc., T. & J.
Squid, bone	11,028	May 21, 1930	*Feb. 21, 1932	Busalacchi, Inc., T. & J.
Squid, bone	7,216	May 23, 1930	*Feb. 21, 1932	Busalacchi, Inc., T. & J.
Squid, bone	7,658	May 24, 1930	Nov. 24, 1931	Busalacchi, Inc., T. & J.
Squid, bone	4,292	May 26, 1930	Nov. 26, 1931	Busalacchi, Inc., T. & J.
Squid, bone	3,768	May 30, 1930	Nov. 30, 1931	Busalacchi, Inc., T. & J.
Squid, bone	35,000	June 1, 1930	Dec. 30, 1931	Consolidated Weir Co.
Squid, bone	4,300	May 3, 1930	June 3, 1931	Corso & Gambino Co., Inc.
Squid, bone	3,680	May 19, 1930	Nov. 1, 1931	Fisher & Son, James W.
Squid, bone	650	May 14, 1930	Nov. 15, 1931	Tocco, Joe
Squid, bone	480	May 17, 1930	Nov. 15, 1931	Tocco, Joe
Squid, bone	1,024	May 20, 1930	Dec. 31, 1931	Tocco, Joe
Squid, bone	24,905	May 2, 1930	Nov. 1, 1931	Tribuna Magri Co.
Whiting, dressed	8,219	Sept. —, 1930	*Apr. 1, 1932	Gorton-Pew Fisheries Co., Ltd.
Whiting, dressed	1,540	May 21, 1930	Nov. 1, 1931	Tribuna Magri Co.

\*The extension granted on this lot was amended before the expiration of the time to which extended. The length of time given includes the total amended period, and the weights given are the initial weights upon which extensions were asked.

\*\*Bait.

TABLE 14. — *Requests for Extension of Time not Granted on Goods in Cold Storage from December 1, 1930, to December 1, 1931*

ARTICLE	Weight (Pounds)	Placed in Storage	Name
Butter	960	Aug. 8, 1930	Holland Creamery Co.
Eggs, mixed	4,080	Apr. 18, 1930	Standard Brands, Inc.
Egg whites	2,160	Apr. 18, 1930	Standard Brands, Inc.
Egg yolks	38,998	Apr. 19, 1930	Keith Co. Inc., H. J.
Egg yolks	1,080	May 18, 1930	Ovson Egg Co.
Egg yolks	1,410	Apr. 18, 1930	Standard Brands, Inc.
Beef	500	June 19, 1930	Davenport, Wm. A.
Lamb	918	Apr. 10, 1930	Solar Co., R.
Eels, small	775	Aug. 20, 1930	Tribuna Magri Co.
Eels, small	590	Aug. 21, 1930	Tribuna Magri Co.
Eels, small	400	Aug. 21, 1930	Tribuna Magri Co.
Eels, small	345	Aug. 22, 1930	Tribuna Magri Co.
Eels, small	2,780	Aug. 26, 1930	Tribuna Magri Co.
Haddock fillets	10,005	Aug. 1, 1930	Beacon Fisheries Co.
Halibut	195	Nov. 8, 1930	Coleman Son Co.
Halibut	125	Nov. 28, 1930	Coleman Son Co.
Mackerel, Bullseye	9,570	Jan. 29, 1930	Burns McKeon Co.
Mackerel, Bullseye	4,552*	May 29, 1930	Burns McKeon Co.
Mackerel, Bullseye	2,525	May 29, 1930	Burns McKeon Co.
Shark	526	May 24, 1930	Tribuna Magri Co.
Sole, lemon	4,000	June 30, 1930	Burns McKeon Co.
Sole, lemon	1,750	Nov. 1, 1930	Burns McKeon Co.
Sole, lemon	390	May 8, 1930	Harding Co., F. E.

\* Bait



TABLE 15. — *Articles which have been in Cold Storage Longer than Twelve Months and on which no Requests for Extensions had been made, ordered removed, from December 1, 1930, to December 1, 1931*

ARTICLE	Weight (Pounds)	Placed in Storage	Name
Butter . . . . .	700	Aug. 8, 1930	Holland Creamery Co.
Butter . . . . .	126	June 23, 1930	Hyannis State Normal School
Butter . . . . .	2,898	June 26, 1930	Lewis Mears Co.
Butter . . . . .	10,860	May 8, 1930	Miller, C. N.
Eggs . . . . .	19,500	June 5, 1930	Friend Bros. Bakeries
Eggs . . . . .	450	Mar. 13, 1930	Ovson Egg Co.
Eggs . . . . .	15,390	Apr. 19, 1930	Ovson Egg Co.
Eggs . . . . .	6,690	Apr. 30, 1930	Stone Co., Chas. H.
Eggs, frozen	1,320	Apr. 5, 1930	Keith Co., H. J.
Eggs, frozen mixed	510	Fr. & Und.	First National Stores
Eggs, mixed	540	Undated	Keith Co., H. J.
Egg whites	540	Undated	Keith Co., H. J.
Egg whites	1,440	June 19, 1930	Land O'Lakes Creamery, Inc.
Egg whites	2,550	July 3, 1930	Land O'Lakes Creamery, Inc.
Eggs, whole	1,500	Mar. 27, 1930	Standard Brands, Inc.
Egg yolks	825	June 21, 1930	Keith Co., H. J.
Egg yolks	3,000	Undated	Land O'Lakes Creamery, Inc.
Egg yolks	480	May 1, 1930	Layton Co., Inc., John
Broilers	459	Dec. 14, 1929	Armour & Co.
Broilers	497	Apr. 25, 1930	Fitzpatrick Bros.
Capons . . . . .	196	Feb. 26, 1930	Corwin Co., C. R.
Capons . . . . .	61	Mar. 6, 1930	Littlefield, J. F.
Chix . . . . .	99	Dec. 16, 1930	Corwin Co., C. R.
Chix . . . . .	31	July 12, 1930	Owens & Son, W. T.
Chix, Guinea	275	Jan. 17, 1930	Hosmer Co., F. H.
Fowl . . . . .	1,824	Nov. 18, 1930	Armour & Co.
Fowl . . . . .	10	Apr. 18, 1930	Howes, C. C.
Poultry . . . . .	120	Sept. 5, 1930	Cudahy Packing Co.
Poultry . . . . .	50	Sept. 10, 1930	Cudahy Packing Co.
Poultry . . . . .	342	June 24, 1930	Land O'Lakes Creamery, Inc.
Poultry . . . . .	42	Nov. 5, 1929	Quincy Market C. S. & W. Co.
Roasters	86	Jan. 23, 1930	Woburn Provision Co.
Roosters (Cox)	415	July 10, 1930	Hosmer Co., F. H.
Turkeys	244	Dec. 31, 1929	Hosmer Co., F. H.
Turkeys	125	Nov. 2, 1929	Owens & Son, W. T.
Beef . . . . .	350	Nov. 7, 1930	Lowell Beef Co.
Beef . . . . .	115	July 1, 1930	Stolar, R.
Beef, boneless	769	Apr. 5, 1930	Shapiro Bros.
Beef, boneless	1,600	July 3, 1930	Shapiro, I.
Beef butts	3,800	Nov. 19, 1929	Armour & Co.
Beef kidneys	108	July 31, 1930	Batchelder, Snyder, Dorr & Doe Co.
Beef rounds	1,022	Dec. 27, 1929	Brighton Dressed Meat Co.
Beef sweetbreads	40	May 5, 1930	Sturtevant Beef & Supply Co.
Beef tenderloins	460	Apr. 25, 1930	Fitzpatrick Bros.
Beef tenderloins	113	Feb. 4, 1930	Liberty Beef Co.
Sirloin butts	1,512	Dec. 13, 1929	Armour & Co.
Cow meat	3,811	Dec. 27, 1929	Brighton Dressed Meat Co.
Cow meat	736	Apr. 8, 1930	Brighton Dressed Meat Co.
Cow meat	2,400	June 19, 1930	Rounsville, P. W.
Calf livers	140	Apr. 17, 1930	Rosoff, T.
Lamb . . . . .	4,704	July 27, 1930	New England Dressed Meat & Wool Co
Lamb legs	50	June 19, 1930	Stolar, R.
Yearlings	3,158	Nov. 25, 1929	Armour & Co.
Yearling legs	673	July 5, 1930	Levine, A. P.
Pork . . . . .	30	Apr. 8, 1930	Howes, C. C.
Pork loins	300	July 1, 1930	Cudahy Packing Co.
Pork loins	822	Apr. 25, 1930	Fitzpatrick Bros.
Spare ribs	13,875	Oct. 30, 1930	Brockelman Bros.
Sweetbreads	600	May 5, 1930	Bohn & Kent Co.
Sweetbreads	24	Aug. 5, 1930	Oliver, C. W.
Sweetbreads	20	Mar. 31, 1930	Rosoff, T.
Veal kidneys	78	Oct. 14, 1930	Batchelder, Snyder, Dorr & Doe Co.
Moose . . . . .	150	Oct. 14, 1930	McPhail, R. T.
Catfish, skinned	135	May 15, 1930	Atlas Fish Co.
Catfish filets	60	May 10, 1930	Gloucester Fresh Fish Co.
Catfish filets	260	July 3, 1930	Gloucester Fresh Fish Co.
Cod filets	820	July 3, 1930	Atlantic & Pacific Fish Co.
Cod filets	140	Oct. 18, 1930	Atlas Fish Co.
Cod filets	75	Nov. 8, 1929	Taylor & Mayo
Devilfish	35	May 5, 1930	Mantia Co., S.
Eels . . . . .	210	July 4, 1930	Rowe & Sullivan
Eels . . . . .	295	Sept. 25, 1930	Rowe & Sullivan
Eels . . . . .	590	Aug. 21, 1930	Tribuna Magri Co.
Eels . . . . .	400	Aug. 21, 1930	Tribuna Magri Co.
Eels . . . . .	345	Aug. 22, 1930	Tribuna Magri Co.
Eels . . . . .	2,780	Aug. 26, 1930	Tribuna Magri Co.
Eels, large	700	Sept. 20, 1930	Mantia & Sons, John
Eels, large	332	Oct. 10, 1930	Phillips Co., B. F.
Eels, large	4,375	Sept. 10, 1930	Russo & Sons
Eels, large	250	Oct. 21, 1930	Tocco, Joe
Eels, small and medium	785	Oct. 16, 1930	Rowe & Sullivan
Eels, small	775	Aug. 20, 1930	Tribuna Magri Co

TABLE 15. — *Articles which had been in Cold Storage Longer than Twelve Months and on which no Requests for Extensions had been made, ordered removed, from December 1, 1930, to December 1, 1931 — Concluded*

ARTICLE	Weight (Pounds)	Placed in Storage	Name
Flounder fillets . . . . .	15	Nov. 29, 1929	Gloucester Fish Co
Flounder fillets . . . . .	120	June 6, 1930	Ward Fisheries Co.
Haddock fillets . . . . .	330	July 26, 1930	Adams & Co., J.
Haddock fillets . . . . .	120	Aug. 2, 1930	Adams & Co., J.
Haddock fillets . . . . .	280	July 3, 1930	Atlantic & Pacific Fish Co.
Haddock fillets . . . . .	825	Aug. 22, 1930	Burns McKeon Co.
Haddock fillets . . . . .	150	June 16, 1930	Collins-Lee Co.
Haddock fillets . . . . .	30	June 16, 1930	Collins-Lee Co.
Haddock fillets . . . . .	90	July 15, 1930	Collins-Lee Co.
Haddock fillets . . . . .	510	July 18, 1930	Collins-Lee Co.
Haddock fillets . . . . .	810	Aug. 30, 1930	Collins-Lee Co.
Haddock fillets . . . . .	20	July 3, 1930	Gloucester Fresh Fish Co.
Haddock fillets . . . . .	60	July 3, 1930	Gloucester Fresh Fish Co.
Haddock fillets . . . . .	840	May 3, 1930	Hunt Co., Cassius
Haddock fillets . . . . .	735	Feb. 6, 1930	Knapp Bros.
Haddock fillets . . . . .	140	July 26, 1930	Methuen Fish Co.
Haddock fillets . . . . .	360	Aug. 6, 1930	Neal Co., J. R.
Haddock fillets . . . . .	60	May 16, 1930	The O'Donnell Co.
Haddock fillets . . . . .	1,020	June 6, 1930	The O'Donnell Co.
Haddock fillets . . . . .	30	Aug. 22, 1930	The O'Donnell Co.
Scrod haddock . . . . .	3,000	Oct. 2, 1930	Prior & Townsend
Hake fillets . . . . .	150	June 24, 1930	Boston Bay Fillet Co.
Hake fillets . . . . .	400	Aug. 22, 1930	O'Hara Bros.
Halibut . . . . .	100	May 7, 1930	Arrington, H. R.
Halibut . . . . .	1,095	Aug. 23, 1930	Coleman Son Co.
Halibut . . . . .	235	Nov. 14, 1930	Hale Fish Co.
Halibut . . . . .	185	Nov. 5, 1930	Tocco, Joe
Halibut . . . . .	28	Nov. 8, 1930	Tocco, Joe
Halibut, chicken . . . . .	139	Aug. 5, 1930	Adams & Co., J.
Halibut, medium . . . . .	200	Nov. 5, 1929	Prior & Townsend
Lobster meat . . . . .	50	May 6, 1930	Brooks & Sprague
Mackerel fillets . . . . .	120	May 31, 1930	Gloucester Fresh Fish Co.
Mullet . . . . .	1,520	Oct. 15, 1930	Tocco, Joe
Pollock fillets . . . . .	750	Dec. 18, 1929	Palmer Fish Co.
Salmon . . . . .	14	July 10, 1930	Adams & Co., J.
Salmon . . . . .	95	Sept. 25, 1930	O'Hara & Co., F. J.
Salmon . . . . .	898	Sept. 30, 1930	Pier Fish Co.
Salmon . . . . .	300	Dec. 10, 1929	Pier Fish Co.
Salmon . . . . .	120	July 18, 1930	Tocco, Joe
Salmon . . . . .	334	Sept. 25, 1930	Ward Fisheries Co.
Scallops, sea . . . . .	160	June 28, 1930	Burns McKeon Co.
Scallops . . . . .	80	May 20, 1930	Eldridge & Son, L. S.
Scallops . . . . .	352	June 10, 1930	Fulham & Herbert
Scallops . . . . .	934	July 29, 1930	Prior & Townsend
Scallops . . . . .	88	May 1, 1930	Rowe & Sullivan
Scallops . . . . .	112	May 5, 1930	Rowe & Sullivan
Scup . . . . .	51	May 16, 1930	Atlas Fish Co.
Scup . . . . .	800	Aug. 2, 1930	Mantia Co., S.
Scup . . . . .	1,600	Aug. 18, 1930	Mantia Co., S.
Scup . . . . .	50	Aug. 11, 1930	Tocco, Joe
Shrimp . . . . .	200	Sept. 22, 1930	Tocco, Joe
Sole, lemon . . . . .	440	July 1, 1930	Prior & Townsend
Squid (bone) . . . . .	179	June 15, 1930	Atwood & Co.
Squid (bone) . . . . .	1,884	June 19, 1930	Mantia & Sons, John
Squid (bone) . . . . .	1,906	May 21, 1930	Peninsi, G.
Squid (bone) . . . . .	4,000	May 3, 1930	Tocco, Joe
Squid . . . . .	170	July 7, 1930	Tocco, Joe
Tuna fish . . . . .	919	Aug. 13, 1930	Mantia Co., S.
Whiting, Dr. . . . .	1,283	Oct. 24, 1930	Peninsi, G.

TABLE 16. — *Summary of Slaughtering Inspections from December 1, 1930, through November 30, 1931*

Total Number of Carcasses Inspected . . . . .	185,825
Cattle . . . . .	27,181
Calves . . . . .	101,012
Hogs . . . . .	47,362
Sheep . . . . .	10,270
Total Number of Carcasses Condemed . . . . .	2,299
Cattle . . . . .	581
Calves . . . . .	1,326
Hogs . . . . .	374
Sheep . . . . .	18

TABLE 17 — *Reasons for Condemnation*

	Cattle	Calves	Hogs	Sheep	Totals
Immaturity	-	1,252	-	-	1,252
Tuberculosis	519	8	102	-	629
Cholera	-	-	137	-	137
Died otherwise than by slaughter	5	22	28	7	62
Pneumonia	6	2	41	-	49
Injured	8	9	16	7	40
Emaciated	12	11	11	1	35
Septicemia	11	2	15	1	29
Enteritis	2	11	-	-	13
Tumor	-	-	7	-	7
Milk fever	4	-	2	-	6
Icterus	-	3	3	-	6
Metritis	5	-	-	-	5
Pyemia	1	-	3	-	4
Slaughtered in inspector's absence	1	1	2	-	4
Measles	-	-	3	-	3
Parasites	-	-	-	2	2
General debility	1	1	-	-	2
Premature	-	2	-	-	2
Edema	1	-	1	-	2
Paralysis	1	-	-	-	1
Mange	-	-	1	-	1
Sexual odor	-	-	1	-	1
Exhaustion	-	1	-	-	1
Pleurisy	1	-	-	-	1
Mastitis	1	-	-	-	1
Dystocia	1	-	-	-	1
Cirrhosis	-	-	1	-	1
Peritonitis	1	-	-	-	1
Indigestion	-	1	-	-	1
Total	581	1,326	374	18	2,299

TABLE 18.—*Confiscations*

## IN WAREHOUSES

	Pounds
Chickens (cooked—in cans)	511½
Chickens	273
Fowl	96
Turkeys	887
Poultry	1090
Beef livers	55
Ham (cooked—in cans)	588
Pork (cooked)	30
Pork tongues (cooked—in cans)	12
Pork trimmings	453
Raccoons	35
Veal sweetbreads	32
Luncheon meat (cooked—in cans)	54
Scup	850

## IN SLAUGHTERHOUSES

	Pounds
1 Hog	200

## IN STORES AND MARKETS

Chickens	6
Fowl	250
Turkeys	18
Beef	786
Pork	36
Hamburg steak	27
Sausage meat	23
Stew meat	7

Total pounds confiscated

5,859



## REPORT OF THE DIVISION OF SANITARY ENGINEERING

ARTHUR D. WESTON, *Director and Chief Engineer*

### OVERSIGHT AND CARE OF INLAND WATERS

#### *Water Supply and Sewerage*

During the calendar year 1931 there were referred to the Engineering Division some 611 applications calling for the advice of the Department, 433 of which related to matters of water supply, 51 to sewerage and sewage disposal, 9 to pollution of streams, 6 to sources of ice supply, and 112 to miscellaneous matters. This number was nearly 5% greater than the number received during a similar period in the previous year.

A new water supply from wells was introduced during the year into the town of Yarmouth, and the town of Southampton installed a water works system for taking water from the Manhan River works of the city of Holyoke, bringing the total number of cities and towns supplied with water from public works at the end of the year 1931 to 238\* out of the total of 355 cities and towns in the State.

The average rainfall throughout the State for the year ending December 31, 1931, as shown by the records kept at eight long-term stations located in different parts of the State, was 44.53, this being 0.20 of an inch in excess of the normal rainfall at these stations. The greatest monthly deficiency occurred in November, but the months of January, February, April, July, September and October were also deficient. The months of May and June had a combined excess of 4.84 inches, while in December the rainfall was normal. March had an excess of 1.28 inches and August of 1.30 inches. At the close of the year there was still a deficiency of 17.07 inches of rainfall since June 1, 1929. It is of interest to note that for the climatological year ending on September 30, 1931, the rainfall was 3.11 inches more than the normal while for the same period ending September 30, 1930, the deficiency was 11.41 inches.

#### *Examination of Camps, Roadside Stands and Summer Hotels*

During the past year examinations were made of conditions affecting water supply and sewerage at 84 recreation camps, 44 summer hotels and 43 wayside stands. In most cases the camps had previously been examined by representatives of this Division and the recent examination showed improved conditions. The examinations of the summer hotels and roadside stands disclosed several questionable sources of water supply, but in most cases the recommendations of the Department resulted in improvements. The examination of the roadside stands was made in connection with an extensive study carried out by the Division of Communicable Diseases.

#### *Construction Work at State Institutions*

During the past year the following contracts were let under the supervision of the Engineering Division:

Lakeville.—Sprinkler installations in various buildings (Contract No. 34). Installation of lightning protection at farm buildings (Contract No. 36).

North Reading.—Sprinkler installations in Nurses' Home Building (Contract No. 27). Sprinkler installations in various buildings (Contract No. 40).

Pondville.—Sprinkler installations in Recreation Building (Contract No. 35). Sewerage construction (Contract No. 37). Cleaning, caulking and painting standpipe (Contract No. 41). Installation of steam mains (Contract No. 42).

Rutland.—Sprinkler installations in various buildings (Contract No. 28).

Westfield.—Sprinkler installations in various buildings (Contract No. 26). Installation of lightning protection at farm buildings (Contract No. 29).

Additional wells (Contract No. 32).

Sprinkler installations in various buildings (Contract No. 33).

Sewerage construction (Contract No. 38).

Sprinkler installations in Employees' Building (Contract No. 39).

\*Includes several smaller towns supplied only in part by water companies, industrial plants, or from other towns.

### *Metropolitan Water Supply*

The construction of the tunnel from Wachusett Reservoir to the Ware River, including the intake works on that river above Coldbrook, was finished during the latter part of the year 1930, and water was diverted for the first time through this tunnel on March 21, 1931. During the period of diversion, which extended from March 21 to midnight of June 14, it was estimated that 12,813,900,000 gallons were diverted. Because of the extended drought commencing with June, 1929, which continued through 1930, the water in Wachusett Reservoir reached the low elevation of 44.96 feet below the elevation of full reservoir, so-called. The water diverted from the Ware River, together with the run-off of the watershed of the Wachusett Reservoir, increased the storage in that reservoir by June 21 some 35,900 million gallons, or to a level of 6.21 feet below the elevation of full reservoir. In the month of December, 1931, an additional diversion from the Ware River of 107,000,000 gallons was made.

### *Joint Investigations*

In accordance with legislation of 1930 and 1931, the Department has carried out the following investigations and reported to the Legislature of 1932 in separate documents:

Joint investigation with the Metropolitan District Commission relative to the practicability and desirability of developing the Mystic and Malden rivers and the marshes adjacent thereto for recreational and other uses. Authorized under Chapter 22, Resolves of 1930. Report printed as House Document 400, 1932.

Joint investigation with the Metropolitan District Commission relative to conditions affecting the flow of the Charles River in that portion of its course lying between Charles River Village and the head of the Charles River Basin at Watertown and recommendations for removing any objectionable conditions especially in that section of the river within the limits of Weston, Newton, Waltham and Watertown. Authorized under Chapter 20, Resolves of 1931. Report printed as House Document 158, 1932.

Joint investigation with the Metropolitan District Commission relative to increasing the capacity of the Charles River Valley sewer with the view to eliminating the overflow of sewage into the Charles River in or near the town of Watertown. Authorized under Chapter 40, Resolves of 1931. Report printed as House Document 159, 1932.

Joint investigation with the Metropolitan District Water Supply Commission, relative to the disposal of sewage and other wastes within the watershed of the Quinapoxet River, a tributary of Wachusett Reservoir, and within the watershed of the Ware River above the village of Coldbrook. Authorized under Chapter 66, Resolves of 1931. Report printed as House Document 402, 1932.

### SANITARY PROTECTION OF PUBLIC WATER SUPPLIES

In accordance with Section 160 of Chapter 111 of the General Laws, the Department adopts rules and regulations for the purpose of preventing the pollution and securing the sanitary protection of the waters used as sources of water supply. During the year 1931 rules and regulations were adopted for the protection of the sources of water supply of the Southbridge Water Supply Company and for certain new sources of supply of the Amherst Water Company.

The cities, towns and fire and water districts for which rules and regulations have now been adopted are as follows:

Abington and Rockland	Attleboro	Concord
Adams (Fire District)	Braintree	Dalton (Fire District)
Amherst (Water Company)	Brockton	Danvers and Middleton
Andover	Cambridge	Easthampton
Ashburnham	Chester (Fire District)	Fall River
Ashfield (Water Company)	Chicopee	Falmouth
	Cohasset (Water Company)	Fitchburg
		Gardner

Gloucester	Marlborough	Rutland
Great Barrington	Maynard	Salem and Beverly
(Housatonic Water	Medfield (State Hospital)	Scituate (Water Com-
Works Company)	Metropolitan Water Dis-	pany)*
Greenfield	trict	Southbridge (Southbridge
Haverhill	Milford (Water Company)	Water Supply Com-
Hingham and Hull (Water	Montague (Turners Falls	pany)
Company)	Fire District)	Springfield
Holden	Newburyport	Stockbridge (Water Com-
Holyoke	Norfolk (State Hospital)	pany)
Hudson	Northampton	Taunton
Lakeville	North Andover	Wakefield
(State Sanatorium)	Northborough	Westborough
Lee (Berkshire Water Co.)	Norwood	Westfield
Leicester (Cherry Valley	Peabody	West Springfield
and Rochdale Water	Pittsfield	Weymouth
District)	Plymouth	Williamsburg
Leominster	Randolph and Holbrook	Winchester
Lincoln and Concord	Rockport	Worcester
Lynn	Russell	

\*Works taken over by town in 1931.



## EXAMINATION OF PUBLIC WATER SUPPLIES

The usual examinations of the public water supplies have been carried on during the year and many of the sources of supply have been examined by engineers of the Division. The waters of the various sources have been analyzed chemically and microscopically, the latter in the case of surface waters, and bacterial examinations have been made whenever practicable.

The following are the average results of chemical analyses of the sources of public water supply examined during the year 1931:

*Analyses of the Water of Public Water Supplies**Averages of Chemical Analyses of Surface-Water Sources for the Year 1931*

[Parts in 100,000]

CITY OR TOWN	SOURCE	Color	Residue on Evaporation	AMMONIA			Chlorine	Hardness
				Free	ALBUMINOID			
					Total	Sus-pended		
Metropolitan Water District . . . . .	Wachusett Reservoir, upper end	.28	4.38	.0044	.0121	.0033	.27	1.5
	Wachusett Reservoir, lower end	.11	3.82	.0029	.0097	.0025	.25	1.4
	Sudbury Reservoir	.12	4.24	.0019	.0105	.0029	.33	1.7
	Framingham Reservoir No. 3 . .	.12	4.74	.0021	.0118	.0030	.33	1.8
	Hopkinton Reservoir . . . . .	.39	4.17	.0028	.0140	.0028	.31	1.2
	Ashland Reservoir	.55	5.39	.0040	.0175	.0033	.46	1.6
	Framingham Reservoir No. 2 . .	.69	7.16	.0070	.0210	.0048	.69	2.3
	Lake Cochituate	.13	8.41	.0094	.0142	.0031	.95	3.5
	Chestnut Hill Reservoir	.14	5.23	.0021	.0094	.0025	.44	1.9
	Weston Reservoir	.12	4.53	.0020	.0100	.0023	.37	1.8
	Spot Pond	.08	9.75	.0013	.0102	.0028	.39	1.7
	Tap in State House	.14	4.88	.0013	.0097	.0025	.45	1.9
	Tap in Revere	.04	4.30	.0005	.0076	.0019	.37	2.0
	Tap in Quincy	.10	5.35	.0011	.0081	.0020	.52	2.3
Abington . . . . .	Big Sandy Pond . . . . .	.06	3.98	.0021	.0107	.0028	.73	0.6
Adams (Fire District)	Dry Brook . . . . .	.08	8.95	.0025	.0067	.0021	.16	7.2
	Bassett Brook	.01	6.00	.0010	.0031	.0012	.14	4.1
Amherst . . . . .	Amethyst Brook large reservoir	.37	4.17	.0017	.0101	.0027	.20	0.8
	Amethyst Brook small reservoir	.15	3.76	.0011	.0134	.0048	.21	0.9
Andover . . . . .	Haggett's Pond	.09	4.97	.0022	.0130	.0029	.45	2.3
Ashburnham . . . . .	Upper Naukeag Lake	.02	2.97	.0008	.0037	.0017	.16	0.7
Ashfield . . . . .	Bear Swamp Brook . . . . .	.22	5.75	.0030	.0093	.0013	.15	3.1
Athol . . . . .	Phillipston Reservoir	.29	4.43	.0087	.0217	.0084	.21	1.3
	Buckman Brook Reservoir	.15	4.30	.0032	.0133	.0026	.18	1.2
	Thousand Acre Meadow Brook	1.04	6.26	.0072	.0221	.0060	.22	1.7
	Inlet of filter . . . . .	.26	4.37	.0038	.0122	.0034	.19	1.4
	Outlet of filter . . . . .	.22	4.53	.0044	.0127	.0036	.19	1.5
Barre . . . . .	Reservoir	.08	4.62	.0014	.0112	.0031	.23	1.9
Blackstone . . . . .	Tap (supply from Woonsocket, R. I.)	.15	9.80	.0016	.0136	.0024	.52	2.1
Blandford (Fire Dist.)	Freeland Brook . . . . .	.06	3.71	.0009	.0038	.0016	.22	1.5
BROCKTON . . . . .	Silver Lake	.05	3.77	.0031	.0116	.0037	.58	0.6
Brookfield . . . . .	Cooley Hill Reservoir	.05	3.61	.0028	.0125	.0020	.19	0.8
CAMBRIDGE . . . . .	Lower Hobbs Brook Reservoir	.14	6.58	.0051	.0188	.0040	.54	2.7
	Upper Hobbs Brook Reservoir	.19	6.55	.0052	.0184	.0042	.54	2.8
	Stony Brook Reservoir	.35	7.57	.0055	.0179	.0038	.68	3.0
	Fresh Pond . . . . .	.08	9.39	.0086	.0157	.0039	.81	5.1
Cheshire . . . . .	Thunder Brook . . . . .	.00	6.48	.0006	.0075	.0028	.13	4.7
	Kitchen Brook . . . . .	.00	5.97	.0048	.0044	.0012	.13	4.1
Chester (Fire District)	Austin Brook Reservoir	.11	4.13	.0015	.0087	.0021	.15	1.7
	Horn Pond . . . . .	.14	4.13	.0051	.0166	.0033	.13	2.0
CHICOPEE . . . . .	Morton Brook . . . . .	.05	5.33	.0023	.0028	.0011	.32	2.0
	Cooley Brook . . . . .	.30	4.84	.0088	.0159	.0065	.23	1.8
Clinton	Tap in town . . . . .	.11	3.66	.0017	.0103	.0021	.23	1.3
Colrain (Griswoldville)	McClellan Reservoir	.07	7.45	.0008	.0043	.0018	.14	5.2
Colrain (Fire District No. 1) . . . . .	Mountain Brook Reservoir	.03	8.63	.0004	.0029	.0008	.14	6.2
Concord . . . . .	Nagog Pond	.01	3.27	.0021	.0125	.0041	.41	1.0
Dalton (Fire District)	Egypt Brook Reservoir	.23	3.35	.0014	.0088	.0032	.13	1.2
	Windsor Reservoir	.41	5.55	.0030	.0169	.0038	.11	2.8
	Cady Brook . . . . .	.26	5.26	.0031	.0115	.0034	.14	2.8
Danvers . . . . .	Middleton Pond . . . . .	.37	4.60	.0039	.0178	.0032	.43	1.9
	Swan Pond . . . . .	.21	4.82	.0091	.0206	.0057	.42	1.9
Deerfield (South Deerfield Water Supply District) . . . . .	Roaring Brook . . . . .	.04	6.76	.0006	.0035	.0009	.22	4.1
Egremont (South) . . . . .	Goodale Brook . . . . .	.02	4.37	.0003	.0024	.0011	.14	2.7

## Averages of Chemical Analyses of Surface-Water Sources, etc.—Continued

[Parts in 100,000]

CITY OR TOWN	SOURCE	Color	Residue on Evaporation	AMMONIA			Chlorine	Hardness
				Free	ALBUMINOID			
					Total	Sus-pended		
FALL RIVER	North Watuppa Lake	.04	4.15	.0024	.0103	.0026	.53	1.0
Falmouth	Long Pond	.01	3.68	.0011	.0074	.0024	1.02	0.5
FITCHBURG	Meetinghouse Pond	.04	3.13	.0060	.0113	.0025	.21	1.1
	Scott Reservoir	.09	3.46	.0082	.0124	.0026	.21	1.0
	Wachusett Lake	.05	3.41	.0079	.0136	.0026	.20	1.0
	Falulah Brook	.10	3.68	.0087	.0110	.0029	.20	1.1
	Ashby Reservoir	.18	3.10	.0076	.0160	.0038	.22	0.8
GARDNER	Crystal Lake	.06	5.27	.0023	.0136	.0049	.32	2.1
GLOUCESTER	Dike's Brook Reservoir	.09	4.75	.0035	.0095	.0027	.93	0.8
	Wallace Reservoir	.31	4.73	.0042	.0137	.0034	1.01	0.7
	Haskell Brook Reservoir	.09	4.20	.0019	.0065	.0017	.84	0.7
Great Barrington (Fire District)	East Mountain Reservoir	.04	5.90	.0029	.0066	.0022	.13	4.2
Great Barrington (Housatonic)	Long Pond	.02	8.55	.0044	.0192	.0037	.17	7.2
Greenfield	Glen Brook Upper Reservoir	.05	6.73	.0040	.0062	.0021	.16	4.7
	Glen Brook Lower Reservoir	.06	6.18	.0043	.0074	.0030	.16	3.7
Hadley (Water Supply District)	Hart's Brook Reservoir	.04	4.20	.0003	.0045	.0014	.27	1.9
Hatfield	Running Gutter Brook Reservoir	.04	7.15	.0002	.0014	.0004	.25	3.0
HAVERHILL	Johnson's Pond	.16	5.92	.0018	.0155	.0034	.46	2.8
	Crystal Lake	.09	3.72	.0010	.0135	.0026	.38	1.4
	Kenoza Lake	.13	5.11	.0020	.0129	.0030	.46	2.4
	Lake Saltonstall	.07	7.23	.0061	.0235	.0098	.67	3.3
	Pentucket Lake	.04	5.16	.0029	.0166	.0040	.47	2.3
	Millvale Reservoir	.56	6.03	.0043	.0189	.0042	.46	2.4
Hingham	Accord Pond	.10	4.05	.0044	.0123	.0032	.65	0.9
	Fulling Mill Pond	.39	6.43	.0083	.0201	.0053	.79	2.0
Hinsdale (Fire District)	Reservoir	.11	2.92	.0008	.0041	.0010	.13	0.7
HOLYOKE	Whiting Street Reservoir	.05	5.44	.0048	.0161	.0039	.24	3.0
	Fomer Reservoir	.22	4.21	.0025	.0127	.0028	.18	1.4
	Wright and Ashley Pond	.07	4.81	.0037	.0117	.0029	.20	2.3
	High Service Reservoir	.08	4.00	.0016	.0140	.0035	.17	1.9
	White Reservoir	.17	4.15	.0089	.0132	.0033	.15	1.8
Hudson	Gates Pond	.10	4.77	.0044	.0128	.0040	.26	1.9
Huntington (Fire District)	Cold Brook Reservoir	.06	4.10	.0004	.0036	.0012	.16	1.6
Ipswich	Dow's Brook Reservoir	.18	5.16	.0063	.0154	.0034	.66	2.1
	Bull Brook	.97	7.70	.0052	.0196	.0027	.72	2.7
LAWRENCE	Merrimack River, filtered	.35	5.99	.0106	.0111	-	.59	2.1
Lee	Coddling Brook Upper Reservoir	.03	5.75	.0011	.0044	.0011	.17	4.3
	Coddling Brook Lower Reservoir	.03	5.94	.0009	.0049	.0018	.18	4.4
	Basin Pond Brook	.34	4.74	.0014	.0107	.0024	.17	1.9
Lenox	Lower Root Reservoir	.02	8.12	.0040	.0092	.0022	.15	6.6
	Woolsey Reservoir	.01	7.25	.0029	.0042	.0013	.14	5.5
LEOMINSTER	Morse Reservoir	.12	3.12	.0051	.0118	.0037	.20	0.6
	Haynes Reservoir	.19	3.12	.0241	.0151	.0047	.19	1.0
	Fall Brook Reservoir	.11	2.97	.0016	.0094	.0027	.18	0.6
Lincoln	Sandy Pond	.03	3.23	.0027	.0077	.0019	.33	1.0
LYNN	Birch Reservoir	.14	5.74	.0095	.0140	.0032	.74	2.2
	Breed's Reservoir	.27	6.82	.0061	.0152	.0031	.80	2.7
	Walden Reservoir	.39	7.60	.0069	.0165	.0033	.83	2.9
	Hawkes Reservoir	.64	8.23	.0115	.0264	.0051	.84	3.7
Manchester	Gravel Pond	.09	4.44	.0017	.0106	.0026	.82	1.4
MARLBOROUGH	Lake Williams	.06	5.67	.0061	.0191	.0040	.64	2.2
	Millham Brook Reservoir	.40	6.05	.0094	.0172	.0040	.50	2.2
Maynard	White Pond	.11	3.02	.0024	.0107	.0026	.28	0.8
Milford	Charles River, filtered	.09	5.68	.0009	.0063	-	.33	2.7
Montague	Lake Pleasant	.04	3.24	.0064	.0073	.0027	.19	0.8
Nantucket	Wannacomet Pond	.05	7.57	.0043	.0155	.0059	2.46	1.7
NEW BEDFORD	Little Quittacas Pond	.16	4.30	.0023	.0143	.0035	.50	1.0
	Great Quittacas Pond	.30	4.31	.0021	.0148	.0032	.51	1.0
NEWBURYPORT	Artichoke River	.43	7.50	.0111	.0290	.0119	.68	2.9
NORTH ADAMS	Notch Brook Reservoir	.03	7.87	.0030	.0036	.0015	.10	7.2
	Broad Brook	.14	4.62	.0016	.0068	.0023	.10	2.4
	Mount Williams Reservoir	.02	7.88	.0016	.0057	.0017	.10	6.5
NORTHAMPTON	Middle Reservoir	.21	5.03	.0029	.0101	.0031	.17	2.1
	Mountain Street Reservoir	.04	4.31	.0019	.0050	.0016	.12	2.1
North Andover	Great Pond	.06	4.77	.0041	.0126	.0029	.47	1.9
Northborough	Lower Reservoir	.54	5.93	.0073	.0236	.0087	.32	1.6
	Upper Reservoir	.60	5.21	.0054	.0195	.0063	.32	1.6
North Brookfield	Doane Pond	.32	4.24	.0044	.0251	.0077	.23	1.2
	North Pond	.29	3.91	.0069	.0230	.0069	.27	1.0
Northfield	Reservoir	.09	3.92	.0003	.0031	.0009	.17	1.2
Norwood	Buckmaster Pond	.11	5.45	.0093	.0184	.0050	.59	2.0
Orange	Reservoir	.31	3.82	.0006	.0098	.0027	.24	1.0
Palmer (Fire District No. 1)	Lower Reservoir	.12	3.54	.0037	.0122	.0037	.21	1.0
	Upper Reservoir	.11	3.00	.0057	.0144	.0044	.21	0.8

*Averages of Chemical Analyses of Surface-Water Sources, etc.—Concluded*  
[Parts in 100,000]

CITY OR TOWN	SOURCE	Color	Residue on Evaporation	AMMONIA			Chlorine	Hardness
				Free	ALBUMINOID			
					Total	Sus- pended		
PEABODY . . .	Spring Pond . . .	.14	6.73	.0073	.0137	.0031	.81	2.6
	Suntaug Lake . . .	.27	6.85	.0073	.0157	.0038	.83	2.5
PITTSFIELD . . .	Ashley Lake . . .	.09	5.04	.0062	.0111	.0031	.15	3.1
	Ashley Brook . . .	.17	5.74	.0056	.0125	.0039	.13	4.1
	Hathaway Brook . . .	.09	8.74	.0006	.0050	.0018	.12	7.2
	Mill Brook . . .	.31	4.98	.0043	.0130	.0034	.14	2.1
	Sackett Brook . . .	.10	7.78	.0007	.0062	.0024	.12	6.3
	Farnham Reservoir . . .	.43	4.82	.0086	.0182	.0047	.14	1.8
Plymouth . . .	Little South Pond . . .	.03	2.96	.0036	.0118	.0045	.61	0.5
	Great South Pond . . .	.03	2.93	.0026	.0089	.0025	.64	0.5
Randolph . . .	Great Pond . . .	.32	6.27	.0019	.0152	.0029	.83	1.9
Rockport . . .	Cape Pond . . .	.28	10.89	.0052	.0190	.0048	3.30	2.3
Russell . . .	Black Brook . . .	.12	4.04	.0006	.0055	.0015	.15	1.3
Rutland . . .	Muschopauge Lake . . .	.03	4.60	.0016	.0086	.0027	.35	2.1
SALEM . . .	Wenham Lake . . .	.35	7.69	.0060	.0191	.0054	.96	3.1
	Longham Reservoir . . .	.78	7.78	.0079	.0237	.0050	1.08	2.6
	Ipswich River at pumping station . . .	1.04	13.98	.0167	.0232	.0067	.83	6.2
Seituate . . .	Inlet of filter . . .	1.25	7.77	.0124	.0210	.0027	1.44	1.7
	Outlet of filter . . .	.05	9.45	.0012	.0047	-	2.19	3.0
Shelburne (Shelburne Falls Fire District)	Fox Brook . . .	.03	5.88	.0003	.0026	.0009	.19	3.3
Southbridge . . .	Hatchet Brook Reservoir No. 3 . . .	.12	3.22	.0053	.0118	.0032	.22	1.0
	Hatchet Brook Reservoir No. 4 . . .	.13	3.58	.0056	.0129	.0036	.23	0.9
South Hadley (Fire District No. 1) . . .	Leaping Well Reservoir . . .	.04	3.05	.0015	.0087	.0033	.18	1.0
	Buttery Brook Reservoir . . .	.09	4.89	.0078	.0095	.0035	.37	1.9
Spencer . . .	Shaw Pond . . .	.04	2.86	.0013	.0097	.0029	.23	0.8
SPRINGFIELD . . .	Westfield Little River, filtered . . .	.11	4.82	.0008	.0048	-	.15	1.7
Stockbridge . . .	Lake Averic . . .	.10	6.55	.0017	.0114	.0037	.11	5.4
Stoughton . . .	Muddy Pond Brook . . .	.14	4.20	.0009	.0049	.0013	.36	0.9
TAUNTON . . .	Assawompsett Pond . . .	.15	3.83	.0041	.0139	.0037	.50	0.8
	Elder's Pond . . .	.03	3.38	.0023	.0121	.0027	.49	0.7
Wakefield . . .	Crystal Lake, filtered . . .	.07	7.88	.0006	.0075	-	.91	3.5
Wareham (Onset) . . .	Jonathan Pond . . .	.01	3.16	.0014	.0101	.0032	.63	0.5
WESTFIELD . . .	Montgomery Reservoir . . .	.37	3.57	.0060	.0130	.0036	.15	0.6
	Tillotson Brook Reservoir . . .	.09	3.48	.0036	.0056	.0018	.16	1.1
	Granville Reservoir . . .	.22	3.19	.0084	.0085	.0025	.15	0.6
West Springfield . . .	Bear Hole Brook . . .	.06	7.46	.0048	.0067	.0026	.22	4.4
	Bear Hole Brook, filtered . . .	.03	7.32	.0003	.0028	-	.22	4.5
West Stockbridge . . .	East Mountain Reservoir . . .	.05	6.20	.0005	.0049	.0015	.18	3.2
Weymouth . . .	Great Pond . . .	.27	4.17	.0014	.0119	.0032	.53	1.1
Williamsburg . . .	Reservoir . . .	.05	4.92	.0007	.0059	.0015	.20	2.5
Williamstown . . .	Rattlesnake Brook . . .	.01	9.83	.0003	.0033	.0016	.09	8.5
	Paul Brook . . .	.01	5.73	.0010	.0038	.0017	.10	4.4
Winchester . . .	North Reservoir . . .	.04	4.22	.0037	.0092	.0026	.42	1.8
	South Reservoir . . .	.01	3.98	.0038	.0086	.0020	.42	1.6
	Middle Reservoir . . .	.06	4.23	.0054	.0135	.0024	.43	1.8
WORCESTER . . .	Bottomly Reservoir . . .	.32	6.90	.0041	.0151	.0036	.27	2.8
	Kent Reservoir . . .	.09	4.64	.0040	.0103	.0026	.29	2.0
	Leicester Reservoir . . .	.08	4.34	.0061	.0111	.0025	.25	1.8
	Mann Reservoir . . .	.09	4.50	.0048	.0114	.0029	.27	2.0
	Upper Holden Reservoir . . .	.10	3.47	.0053	.0096	.0022	.21	1.1
	Lower Holden Reservoir . . .	.07	3.38	.0067	.0086	.0022	.22	1.0
	Kendall Reservoir . . .	.05	4.15	.0117	.0089	.0031	.26	1.7
	Pine Hill Reservoir . . .	.26	4.42	.0189	.0148	.0036	.29	1.8



## Averages of Chemical Analyses of Ground-Water Sources for the Year 1931

[Parts in 100,000]

CITY OR TOWN	Source	Color	Residue on Evaporation	AMMONIA		Chlorine	NITROGEN AS —		Hardness	Iron
				Free	Albu- minoid		Nitrates	Nitrites		
Acton (West and South Water Supply District)	Tubular wells	.01	8.68	.0002	.0011	.61	.0908	.0000	4.1	.009
Adams (Fire District)	Tubular wells	.00	13.70	.0002	.0007	.14	.0390	.0000	12.8	.007
Amesbury	Tubular wells	.06	16.65	.0108	.0029	.53	.0020	.0001	8.5	.788
	filtered wells,									
	. . . . .	.02	15.65	.0003	.0017	.55	.0020	.0000	8.2	.013
Ashland	Tubular wells,									
	new supply	.01	6.92	.0004	.0017	.49	.0020	.0000	2.8	.007
ATTLEBORO	Wells	.02	6.00	.0005	.0023	.51	.0038	.0000	2.5	.010
	Wells near Wad- ing River	.12	5.47	.0035	.0028	.40	.0730	.0000	2.1	.109
Auburn	Tubular wells	.01	9.97	.0004	.0008	.68	.1900	.0000	4.8	.007
Avon	Wells	.01	7.77	.0002	.0012	.68	.2133	.0000	3.2	.009
Ayer	Large well	.02	9.24	.0006	.0012	1.02	.0992	.0000	3.6	.021
	Tubular wells	.03	7.92	.0006	.0013	.48	.0044	.0000	3.9	.043
Barnstable	Tubular wells	.02	4.70	.0007	.0007	1.07	.0020	.0000	0.6	.020
Bedford	Large well	.05	6.07	.0007	.0022	.56	.0112	.0700	2.5	.010
Belchertown	Tubular wells	.01	8.23	.0003	.0017	.37	.0190	.0001	3.1	.006
Billerica	Wells	.04	16.31	.0080	.0042	.47	.0043	.0001	7.0	.493
Bourne (Monument Beach)	Wells	.01	5.67	.0004	.0009	.96	.0300	.0090	1.5	.008
Bridgewater	Wells	.02	6.05	.0006	.0008	.66	.1050	.0000	1.8	.013
Brookline	Tubular wells and filter-gallery, fil- tered	.05	10.12	.0003	.0045	.84	.0188	.0000	4.7	.007
Canton	Springdale well	.07	7.00	.0003	.0023	.61	.0475	.0000	2.8	.007
	Well near Henry's Spring	.05	6.05	.0002	.0014	.62	.0725	.0000	2.4	.010
	Ward well	.10	7.70	.0003	.0033	.63	.0400	.0000	2.9	.010
Chatham	Filter-gallery	.01	6.50	.0012	.0088	1.91	.0020	.0001	0.8	.018
Chelmsford (North Chelmsford Fire District)	Tubular wells	.11	6.23	.0165	.0087	.46	.0113	.0001	2.3	.034
Chelmsford (Water District)	Tubular wells	.00	9.75	.0003	.0015	.58	.0925	.0007	3.8	.014
Cohasset	Tubular wells	.03	15.15	.0005	.0022	1.90	.1800	.0000	5.9	.007
	Dug well, filtered	.30	7.65	.0022	.0068	1.11	.0020	.0000	2.3	.023
Cummington	Tubular wells	.01	4.80	.0007	.0011	.26	.1467	.0000	2.5	.010
Dedham	Large well and tubular wells	.04	11.98	.0016	.0049	1.02	.0800	.0000	4.7	.011
Deerfield (Fire District)	Wells	.00	4.32	.0001	.0006	.24	.0027	.0000	2.3	.010
Douglas	Tubular wells	.01	5.10	.0001	.0006	.34	.0625	.0000	1.9	.008
Dracut (Water Sup- ply District)	Tubular wells	.22	14.52	.0024	.0078	.78	.0825	.0000	7.1	.040
Dracut (Collinsville)	Tubular wells	.01	6.05	.0006	.0021	.46	.0425	.0000	2.8	.013
Dudley	Tubular wells	.00	4.27	.0008	.0019	.28	.0020	.0000	1.6	.009
Dunstable	Well	.00	10.17	.0005	.0007	.60	.4500	.0004	3.8	.007
Duxbury (Fire and Water District)	Tubular wells	.00	4.40	.0001	.0005	.82	.0020	.0000	0.8	.007
East Brookfield	Tubular wells	.00	2.90	.0002	.0008	.23	.0020	.0000	0.6	.011
Easthampton	Tubular wells	.00	7.40	.0001	.0009	.19	.0150	.0000	4.3	.006
Easton (North East- on Village District)	Well	.00	6.05	.0006	.0015	.53	.0892	.0000	2.4	.009
Edgartown	Large well	.00	3.23	.0002	.0006	.94	.0020	.0000	0.5	.006
Fairhaven	Old wells	.37	8.50	.0011	.0093	1.06	.0617	.0000	3.4	.028
	New wells	.02	6.43	.0001	.0011	1.07	.1233	.0000	2.5	.009
Foxborough (Water Supply District)	Tubular wells	.03	5.37	.0002	.0009	.44	.0367	.0001	2.3	.010
Framingham	Filter-gallery	.02	14.87	.0108	.0045	2.24	.0135	.0004	6.4	.019
Franklin	Tubular wells	.01	4.87	.0003	.0027	.51	.0020	.0000	2.2	.012
Gill	Spring	.00	8.10	.0003	.0019	.35	.0500	.0000	3.9	.007
Grafton	Filter-gallery	.01	11.90	.0001	.0017	1.47	.2000	.0000	4.8	.010
Granville	Well	.04	3.00	.0001	.0023	.11	.0020	.0000	1.1	.009
Great Barrington (Fire District)	Well near Green River	.01	11.47	.0002	.0011	.13	.0027	.0000	9.3	.007
	Filter-gallery near Green River	.04	10.21	.0001	.0015	.14	.0027	.0000	7.8	.014
Greenfield	Well near Green River	.04	7.40	.0006	.0020	.19	.0020	.0001	4.5	.018
Groton	Large well	.00	7.23	.0035	.0013	.25	.0020	.0000	4.2	.012
Groton (West Groton Water Supply Dis- trict)	Tubular wells	.01	5.73	.0007	.0007	.22	.0073	.0000	3.3	.012
Hardwick (Gilbertville)	Wells	.00	7.77	.0001	.0007	.18	.0020	.0000	4.0	.009
Hardwick (Wheel- wright)	Wells	.01	3.73	.0000	.0004	.21	.0080	.0000	1.2	.006
Hingham	Wells	.13	6.68	.0042	.0052	.76	.0117	.0000	2.3	.014
Holliston	Large wells	.37	5.65	.0019	.0120	.38	.0020	.0000	2.1	.043

## Averages of Chemical Analyses of Ground-Water Sources, etc.—Continued

[Parts in 100,000]

CITY OR TOWN	Source	Color	Residue on Evaporation	AMMONIA		Chlorine	NITROGEN AS —		Hardness	Iron
				Free	Albu- minoid		Nitrates	Nitrites		
Hopkinton . . .	New tubular wells	.01	7.50	.0004	.0009	.45	.0967	.0001	2.8	.010
Kingston . . .	Tubular wells	.00	4.73	.0007	.0010	.71	.0030	.0000	1.3	.006
Leicester (Water Supply District)	Wells . . .	.05	8.27	.0003	.0032	.27	.0467	.0000	4.4	.009
Leicester (Cherry Valley and Rochdale Water District)	Wells . . .	.15	5.07	.0037	.0105	.35	.0020	.0000	2.4	.012
Littleton . . .	Tubular Wells	.00	4.90	.0004	.0007	.26	.0173	.0000	2.1	.007
LOWELL . . .	Boulevard wells (tubular)	.91	8.67	.0766	.0061	.58	.0177	.0001	3.0	.465
	Boulevard wells, filtered	.12	7.10	.0004	.0027	.56	.0392	.0000	2.8	.034
Manchester . . .	Wells . . .	.01	10.23	.0003	.0016	1.59	.0642	.0000	4.0	.017
Mansfield (Water Supply District)	Large well . .	.00	4.38	.0003	.0009	.42	.0055	.0000	1.5	.009
Marblehead . . .	Inlet of filter	.07	18.05	.0057	.0033	2.00	.0020	.0001	8.9	.221
	Outlet of filter	.13	18.15	.0010	.0042	1.80	.0020	.0000	9.5	.048
	Well . . .	.11	21.48	.0005	.0039	3.14	.0130	.0000	10.1	.044
Marion . . .	Old wells . .	.01	5.16	.0001	.0009	.68	.0068	.0000	1.8	.009
	New wells . .	.01	8.35	.0001	.0009	1.31	.0450	.0000	3.4	.057
Marshfield . . .	Tubular wells	.00	4.62	.0002	.0008	.72	.0020	.0000	0.7	.009
	Tubular wells at Humarock Beach	.00	8.90	.0001	.0011	2.33	.0300	.0000	2.5	.005
Mattapoisett . .	New wells . .	.02	6.53	.0001	.0015	.79	.0207	.0000	2.3	.009
	Old wells . .	.05	6.55	.0004	.0013	.78	.0325	.0000	2.6	.017
Medfield . . .	Spring . . .	.06	4.27	.0009	.0027	.33	.0020	.0000	1.7	.007
Medway . . .	Wells . . .	.03	8.47	.0083	.0022	.96	.0433	.0000	3.4	.015
Merrimac . . .	Tubular wells	.00	8.10	.0003	.0003	.59	.0173	.0000	3.5	.018
Methuen . . .	Tubular Wells at Harris Brook	.43	7.69	.0048	.0118	.57	.0113	.0000	3.2	.091
	Tubular wells at Pine Island	.01	11.40	.0017	.0014	1.02	.2500	.0005	5.3	.013
Middleborough (Fire District)	Well . . .	.19	8.08	.0111	.0050	.71	.0308	.0000	3.1	.477
	Filtered water	.21	8.02	.0104	.0037	.70	.0245	.0001	2.7	.222
Millbury . . .	Well . . .	.01	6.20	.0003	.0013	.40	.0383	.0000	2.9	.008
Millis . . .	Spring . . .	.03	12.94	.0017	.0012	.97	.2400	.0002	6.3	.035
Monson . . .	Old well . .	.12	4.15	.0002	.0024	.21	.0020	.0000	1.0	.009
	New well . .	.00	3.85	.0002	.0015	.19	.0022	.0000	0.9	.008
Monterey . . .	Springs . . .	.01	9.70	.0003	.0018	.15	—	—	8.5	.007
Nantucket . . .	Wells at Wyers Valley	.00	5.33	.0002	.0008	1.82	.0020	.0000	1.5	.010
Natick . . .	Large well . .	.01	11.70	.0002	.0013	1.15	.0333	.0000	6.1	.007
Needham . . .	Old wells and Hicks Spring	.01	9.22	.0003	.0016	.80	.1740	.0000	3.7	.009
	New wells . .	.02	8.72	.0002	.0021	.86	.1400	.0000	3.6	.009
NEWBURYPORT .	Wells and Arti-choke River, filtered	.11	7.14	.0014	.0004	.68	.0190	.0000	2.9	.039
NEWTON . . .	Tubular wells and filter-gallery	.03	7.92	.0008	.0034	.74	.0085	.0000	3.2	.019
North Attleborough	Wells . . .	.01	7.12	.0003	.0015	.56	.0230	.0000	2.9	.010
Northbridge . .	Tubular wells	.01	4.52	.0003	.0010	.30	.0020	.0000	1.4	.012
Norton . . .	Tubular wells	.02	5.50	.0002	.0007	.33	.0020	.0000	1.5	.039
Norwood . . .	Tubular wells	.07	9.72	.0017	.0019	.72	.0582	.0000	4.2	.116
Oak Bluffs . . .	Springs . . .	.00	4.40	.0018	.0010	.87	.0020	.0000	0.9	.012
Orange . . .	Crystal Spring	.05	4.27	.0003	.0019	.19	—	—	1.0	.009
Oxford . . .	Tubular wells	.00	4.67	.0003	.0008	.36	.0300	.0000	2.4	.007
Palmer (Bondsville)	Tubular wells	.00	6.30	.0001	.0007	.28	.0233	.0000	2.6	.011
Pepperell . . .	Tubular wells	.00	4.57	.0009	.0017	.22	.0020	.0000	1.6	.005
Provincetown . .	Tubular wells	.01	9.30	.0003	.0007	3.40	.0020	.0000	2.0	.014
Reading . . .	Filter-gallery	.95	10.60	.0158	.0163	1.15	.0030	.0000	3.0	.342
	Tap in pumping station	.16	16.03	.0052	.0066	1.04	.0020	.0014	6.4	.084
Salisbury . . .	Old well . .	.10	7.50	.0010	.0029	.61	.0020	.0000	3.2	.013
	New well . .	.13	9.55	.0004	.0009	.63	.0020	.0000	3.4	.087
Scituate . . .	Webster Meadow wells	.00	11.83	.0009	.0011	1.77	.0633	.0002	4.7	.013
Sharon . . .	Well . . .	.00	21.57	.0003	.0011	3.75	.3775	.0001	9.5	.010
	Tubular wells	.00	5.72	.0002	.0011	.65	.0430	.0000	2.5	.014
Sheffield . . .	Smith Spring	.01	3.55	.0003	.0013	.13	.0020	.0000	2.2	.007
	Clark's Spring	.03	4.85	.0006	.0017	.15	.0020	.0000	3.2	.006
Shirley (Shirley Village Water District)	Well . . .	.01	5.27	.0000	.0006	.45	.1475	.0000	1.9	.015
Shrewsbury . . .	Tubular wells	.02	6.72	.0002	.0014	.47	.0440	.0000	2.5	.016
Somerset . . .	Tubular wells	.03	9.27	.0002	.0010	.57	.0024	.0000	3.7	.031
South Hadley (Fire District No. 2)	Large well . .	.01	5.27	.0004	.0017	.16	.0020	.0000	2.2	.008
Sunderland . . .	Springs . . .	.02	8.13	.0001	.0009	.17	.0020	.0000	4.5	.012
Tisbury . . .	Well . . .	.00	3.85	.0001	.0004	.97	.0020	.0000	0.5	.005
Uxbridge . . .	Tubular wells	.00	5.83	.0003	.0011	.56	.0700	.0000	2.6	.007
Walpole . . .	Tubular wells	.02	5.23	.0002	.0011	.48	.0267	.0000	2.3	.023

*Averages of Chemical Analyses of Ground-Water Sources, etc.—Concluded*

[Parts in 100,000]

CITY OR TOWN	Source	Color	Residue on Evaporation	AMMONIA		Chlorine	NITROGEN AS —		Hardness	Iron
				Free	Albu- minoid		Nitrates	Nitrites		
WALTHAM	Old well	.07	10.56	.0039	.0034	.85	.0025	.0000	4.6	.069
	New well	.00	8.29	.0008	.0021	.68	.0104	.0000	3.9	.007
Ware	Wells	.00	9.06	.0007	.0010	.52	.1212	.0001	3.7	.013
	Large well	.00	7.41	.0002	.0010	.41	.0728	.0000	3.0	.007
Wareham (Fire District)	Tubular wells	.00	4.23	.0003	.0008	.60	.0020	.0000	1.3	.006
Warren	Tubular wells	.00	5.20	.0005	.0007	.23	.0137	.0000	1.2	.007
Wayland	Wells	.00	8.42	.0002	.0010	.54	.0550	.0000	4.3	.023
Webster	Wells	.00	4.53	.0015	.0018	.32	.0107	.0000	2.2	.012
Wellesley	Tubular wells	.06	10.77	.0005	.0020	1.03	.0558	.0000	4.4	.053
	Well at Williams Spring	.19	10.20	.0014	.0096	1.20	.0275	.0000	4.7	.007
	Filter-gallery	.02	11.95	.0004	.0019	1.14	.1433	.0001	5.2	.007
Westborough	Filter basin	.05	3.42	.0030	.0091	.27	—	—	1.1	.017
West Brookfield	Tubular wells	.00	5.25	.0000	.0004	.24	.0020	.0000	1.4	.009
Westford	Tubular wells	.01	6.60	.0003	.0006	.25	.0020	.0000	2.6	.010
Weston	Well at Warren Avenue	.15	8.22	.0004	.0048	.68	.0575	.0000	4.1	.018
	Tubular wells at Kendal Green	.02	9.24	.0001	.0008	.84	.0600	.0000	3.9	.027
West Stockbridge	Johnson's Spring	.01	6.70	.0007	.0021	.14	.0020	.0000	4.1	.011
Williamstown	Cold Spring	.00	13.23	.0002	.0006	.09	.0150	.0000	13.4	.008
	Sherman Spring	.00	10.47	.0002	.0037	.09	.0020	.0000	8.6	.007
Wilmington	Tubular wells	.00	7.89	.0002	.0009	.77	.0800	.0000	3.0	.006
Winchendon	Old wells	.39	4.32	.0020	.0042	.15	.0020	.0000	1.5	.179
	New wells	.29	3.62	.0012	.0061	.13	.0020	.0000	1.3	.027
WOBURN	Filter-gallery	.01	9.87	.0005	.0027	1.09	.0050	.0000	4.8	.007
	Layne well	.02	13.25	.0054	.0025	1.40	.0162	.0001	6.8	.010
Worthington (Fire District)	Springs	.07	3.10	.0001	.0015	.18	.0020	.0000	1.7	.126
Wrentham	Tubular wells	.00	5.27	.0003	.0010	.38	.0525	.0000	2.1	.007
Yarmouth	Tubular wells	.01	5.25	.0002	.0007	1.47	.0020	.0000	0.8	.018

## CONSUMPTION OF WATER

The consumption of water during the twelve months ending with December 31, 1931, in the various cities and towns throughout the State was in general somewhat less than during the similar period in 1929 and 1930. This reduction probably can be accounted for by the greater rainfall during the summer months and a decrease in the use of water for industrial purposes.

The following table shows the water consumption in the various cities and towns where records are kept, copies of which are supplied to this Department, and the figures represent the amount of water consumed through all of the public water supplies in any one municipality.

*Average Daily Consumption of Water in Various Cities and Towns in 1931*

CITY OR TOWN	Esti- mated Popu- lation	Gallons	Gallons per Inhabit- ant	CITY OR TOWN	Esti- mated Popu- lation	Gallons	Gallons per Inhabit- ant
Metropolitan Water District				Acton	2,501	90,000	36
Arlington	38,324	1,998,000	52	Acushnet	4,092	67,000	16
Belmont	23,046	1,323,000	57	Agawam	7,256	302,000	42
BOSTON	781,502	89,753,000	115	Amesbury	12,035	656,000	55
CHELSEA	45,816	3,580,000	78	Amherst	5,888	548,000	93
EVERETT	49,694	4,900,000	99	Andover	9,969	842,000	84
Lexington	9,803	648,000	66	Ashburnham	2,079	97,000	47
MALDEN	59,285	3,883,000	65	Ashland	2,397	169,000	71
MEDFORD	62,132	3,341,000	54	Athol	10,892	622,000	57
MELROSE	23,771	1,659,000	70	ATTLEBORO	21,999	1,158,000	53
Milton	17,149	903,000	53	Avon	2,424	134,000	55
Nahant	1,659	205,000	124	Ayer	3,066	186,000	61
QUINCY	74,369	5,264,000	71	Barnstable	7,271	377,000	52
REVERE	36,164	2,284,000	63	Bedford	2,820	128,000	45
SOMERVILLE	104,884	10,136,000	97	Belchertown	3,186	26,000	8
Stonham	10,255	687,000	67	BEVERLY	25,566	1,473,000	58
Swampscott	10,625	799,000	75	BillERICA	6,074	306,000	50
Watertown	36,810	2,168,000	59	Blandford	567	10,900	19
Winthrop	16,990	1,246,000	73	Braintree	16,216	1,000,000	62
Abington and Rockland	13,396	575,000	43	Bridgewater	9,055	209,000	23
				BROCKTON	63,797	2,991,000	47
				Brookfield	1,352	54,000	40



*Average Daily Consumption of Water in Various Cities and Towns in 1931 — (Concluded)*

CITY OR TOWN	Estimated Population	Gallons	Gallons per Inhabitant	CITY OR TOWN	Estimated Population	Gallons	Gallons per Inhabitant
Brookline . . .	48,452	4,663,000	96	Millbury . . .	7,060	416,000	59
CAMBRIDGE . .	113,643	12,537,000	110	Millis . . .	1,738	147,000	84
Canton . . .	5,816	611,000	105	Montague . . .	9,352	844,000	90
Chatham . . .	1,969	60,000	30	Nantucket . . .	3,783	595,000	137
Chelmsford . .	7,112	204,000	29	Natick . . .	13,733	759,000	55
CHICOPEE . . .	44,340	2,857,000	64	Needham . . .	11,219	713,000	64
Clinton . . .	12,817	744,000	58	NEW BEDFORD .	112,597	9,460,000	84
Cohasset . . .	3,117	241,000	77	NEWBURYPORT .	15,084	1,271,000	84
Concord . . .	7,561	619,000	82	NEWTON . . .	67,730	4,983,000	74
Danvers and Middleton . . .	14,910	1,221,000	82	North Andover .	6,985	418,000	60
Dartmouth . .	8,778	196,000	22	North Attle- borough . . .	10,278	748,000	73
Dedham . . .	15,380	1,091,000	71	Northbridge . .	9,713	715,000	74
Douglas . . .	2,195	155,000	71	North Brookfield	3,013	381,000	126
Dracut . . .	7,014	166,000	24	Norton . . .	2,737	131,000	48
Dudley . . .	4,265	155,000	36	Norwood . . .	15,229	1,127,000	74
Duxbury . . .	1,698	191,000	112	Oak Bluffs . . .	1,336	145,000	109
East Bridgewater	3,601	143,000	40	Oxford . . .	3,943	159,000	40
East Brookfield .	926	40,000	43	PEABODY . . .	21,640	2,786,000	129
Easthampton . .	11,323	803,000	71	Pepperell . . .	2,950	249,000	84
East Longmeadow	3,366	79,000	24	PITTSFIELD . .	50,237	5,156,000	103
Easton . . .	5,298	245,000	46	Plainville . . .	1,597	119,000	74
Edgartown . . .	1,284	137,000	107	Plymouth . . .	13,042	1,035,000	79
Fairhaven . . .	10,975	458,000	42	Provincetown .	3,832	320,000	84
FALL RIVER . .	115,274	6,239,000	54	Randolph and Holbrook . . .	10,104	652,000	64
Falmouth . . .	4,846	644,000	133	Reading . . .	9,982	420,000	42
FITCHBURG . . .	40,692	3,956,000	97	Rockport . . .	3,630	341,000	94
Foxborough . . .	5,430	514,000	95	Rutland . . .	2,483	229,000	92
Framingham . .	22,437	1,424,000	63	SALEM . . .	43,460	4,870,000	112
Franklin . . .	7,028	445,000	63	Salisbury . . .	2,269	186,000	82
GARDNER . . .	19,533	851,000	44	Saugus . . .	15,092	831,000	55
GLOUCESTER . .	24,370	1,636,000	67	Scituate . . .	3,199	540,000	169
Grafton . . .	7,041	238,000	34	Sharon . . .	3,397	290,000	85
Great Barrington	5,934	529,000	89	Shelburne . . .	1,545	81,000	52
Greenfield . . .	15,551	1,316,000	85	Shirley . . .	2,434	80,000	33
Groton . . .	2,436	207,000	85	Shrewsbury . .	7,128	262,000	37
Groveland . . .	2,336	46,500	20	Somerset . . .	5,514	195,000	35
Hanover . . .	2,818	80,000	28	Southborough . .	2,189	78,000	36
Hanson and Pem- broke . . .	3,682	93,000	25	Southbridge . .	14,264	521,000	37
HAVERHILL . . .	48,710	3,794,000	78	South Hadley . .	6,805	464,000	68
Hingham . . .	6,750	1,539,000	228	Southwick . . .	1,500	18,000	12
Holliston . . .	2,874	89,000	31	SPRINGFIELD .	151,467	14,613,000	96
HOLYOKE . . .	56,537	7,079,000	125	Stockbridge . . .	1,762	233,000	132
Hopkinton . . .	2,563	60,000	23	Stoughton . . .	8,273	595,000	72
Hudson . . .	8,537	385,000	45	TAUNTON . . .	37,355	2,802,000	75
Ipswich . . .	5,599	251,000	45	Tisbury . . .	1,563	207,000	133
Kingston . . .	2,702	254,000	94	Uxbridge . . .	6,308	218,000	35
Lancaster . . .	2,940	123,000	42	Wakefield . . .	16,460	717,000	44
LAWRENCE . . .	85,068	4,234,000	50	Walpole . . .	7,426	1,296,000	174
Lenox . . .	2,742	300,000	109	WALTHAM . . .	40,147	2,170,000	54
Lincoln . . .	1,530	238,000	156	Ware . . .	7,385	307,000	42
Littleton . . .	1,454	74,000	51	Wareham . . .	5,704	302,000	53
Longmeadow . .	4,658	238,000	51	Wayland . . .	3,053	229,000	75
LOWELL . . .	100,234	5,594,000	56	Webster . . .	12,992	633,000	49
Ludlow . . .	8,890	354,000	40	Wellesley . . .	11,917	846,000	71
LYNN . . .	102,320	7,630,000	75	West Bridgewater	3,223	149,000	46
Lynnfield . . .	1,646	32,000	20	West Brookfield .	1,255	56,000	45
Manchester . . .	2,663	386,000	145	WESTFIELD . . .	19,862	1,795,000	90
Mansfield . . .	6,364	447,000	70	Westford . . .	3,606	168,000	47
Marblehead . . .	8,759	723,000	83	Weston . . .	3,417	187,000	55
Marion . . .	1,711	170,000	99	West Springfield	16,955	1,392,000	82
MARLBOROUGH .	15,587	605,000	45	Westwood . . .	2,175	29,000	13
Marshfield . . .	1,625	193,000	119	Weymouth . . .	21,608	1,424,000	66
Mattapoisett . .	1,501	89,000	59	Whitman . . .	7,638	278,000	36
Maynard . . .	7,156	303,000	42	Wilbraham . . .	2,719	68,000	25
Medfield . . .	4,106	81,000	20	Wilmington . .	4,113	72,000	17
Medway . . .	3,153	164,000	52	Winchester . . .	12,950	842,000	65
Merrimac . . .	2,400	133,000	55	WOBBURN . . .	19,646	1,709,000	87
Methuen . . .	21,162	1,025,000	48	WORCESTER . .	196,222	14,504,000	74
Middleborough .	8,608	283,000	33	Wrentham . . .	3,658	139,000	38
Milford . . .	17,714	914,000	52				

**RAINFALL**

The following table shows the normal rainfall in the State as deduced from records at eight widely distributed stations having records for more than 50 years, also the rainfall for the year 1931, and the excess or deficiency of precipitation in each month as compared with the normal.

MONTH	Normal Rainfall (Inches)	Rainfall in 1931 (Inches)	Excess or Deficiency in 1931 (Inches)	MONTH	Normal Rainfall (Inches)	Rainfall in 1931 (Inches)	Excess or Deficiency in 1931 (Inches)
January . . .	3.75	3.49	-0.26	August . . .	4.17	5.47	+1.30
February . . .	3.60	2.66	-0.94	September . . .	3.39	1.88	-1.51
March . . .	3.91	5.19	+1.28	October . . .	3.66	2.82	-0.84
April . . .	3.68	3.05	-0.63	November . . .	3.85	1.16	-2.69
May . . .	3.58	4.92	+1.34	December . . .	3.68	3.69	+0.01
June . . .	3.33	6.83	+3.50				
July . . .	3.73	3.37	-0.36	Totals . . .	44.33	44.53	+0.20

FLOW OF STREAMS  
*Sudbury River*

The average yield of the Sudbury River in the year 1931 was 889,000 gallons per day per square mile of drainage area. The normal flow of this river for the 57 years during which records have been maintained is 967,000 gallons per square mile per day. The average daily yield for the six driest months, July to December, inclusive, was 110,000 gallons per square mile, or 28.5 per cent of the normal.

The following table shows the relation between the average daily yield of the Sudbury River per square mile in each month in the year 1931 and the normal yield of the river during the past 57 years. The drainage area of the river at the point of measurement is 75.2 square miles.

*Table showing the Average Daily Yield of the Sudbury River for Each Month in the Year 1931, in Cubic Feet per Second per Square Mile of Drainage Area, and in Million Gallons per Day per Square Mile of Drainage Area; also, Departure from the Normal.*

MONTH	NORMAL YIELD		ACTUAL YIELD IN 1931		EXCESS OR DEFICIENCY	
	Cubic Feet per Second per Square Mile	Million Gallons per Day per Square Mile	Cubic Feet per Second per Square Mile	Million Gallons per Day per Square Mile	Cubic Feet per Second per Square Mile	Million Gallons per Day per Square Mile
January . . . . .	1.712	1.107	.721	.466	— .991	— .641
February . . . . .	2.371	1.532	1.584	1.024	— .787	— .508
March . . . . .	4.125	2.666	5.342	3.453	+1.217	+ .787
April . . . . .	3.036	1.962	3.006	1.943	— .030	— .019
May . . . . .	1.704	1.102	1.839	1.188	+ .135	+ .086
June . . . . .	.819	.529	3.052	1.972	+2.233	+1.443
July . . . . .	.323	.209	.483	.312	+ .160	+ .103
August . . . . .	.343	.222	.199	.129	— .144	— .093
September . . . . .	.354	.229	— .158	— .102	— .512	— .331
October . . . . .	.576	.372	— .042	— .027	— .618	— .399
November . . . . .	1.163	.752	.067	.043	—1.096	— .709
December . . . . .	1.478	.955	.461	.298	—1.017	— .657
Average for whole year . . . . .	1.496	.967	1.376	.889	— .120	— .078

The rainfall on the Sudbury River watershed and the total yield expressed in inches in depth upon the watershed (inches of rainfall collected) for each of the past six years, 1926 to 1931, inclusive, together with the average for a period of fifty-seven years, are given in the following table:

*Rainfall, in Inches, received and collected on the Sudbury River Drainage Area*

MONTH	1926			1927			1928		
	Rain- fall	Rain- fall col- lected	Per Cent col- lected	Rain- fall	Rain- fall col- lected	Per Cent col- lected	Rain- fall	Rain- fall col- lected	Per Cent col- lected
January . . . . .	3.00	1.539	51.2	2.91	2.313	79.5	2.69	2.328	86.7
February . . . . .	5.92	1.596	27.0	3.71	2.355	63.5	3.62	2.746	75.9
March . . . . .	3.23	4.863	150.6	1.43	3.664	256.6	1.96	2.274	116.3
April . . . . .	2.21	3.323	150.5	2.24	1.194	53.3	5.44	3.035	55.7
May . . . . .	2.29	1.284	56.1	2.97	1.369	46.1	2.47	2.523	102.4
June . . . . .	1.60	.179	11.2	1.99	.370	18.6	6.36	2.736	43.0
July . . . . .	3.18	— .122	— 3.8	3.82	.232	6.1	5.46	2.170	39.7
August . . . . .	5.51	.415	7.5	8.92	1.638	18.9	4.50	.981	21.8
September . . . . .	1.40	— .196	— 14.0	3.82	2.260	59.3	3.84	1.026	26.7
October . . . . .	3.77	.203	5.4	5.10	2.313	45.3	3.52	.938	26.7
November . . . . .	5.27	1.386	26.3	8.21	6.950	84.6	2.16	1.018	47.0
December . . . . .	4.03	1.195	29.7	5.61	4.931	87.8	2.68	1.500	56.0
Totals and averages . . . . .	41.41	15.665	37.8	50.73	29.639	58.4	44.70	23.275	52.1

*Rainfall, in Inches, received and collected on the Sudbury River Drainage Area—Cont.*

MONTH	1929			1930			1931			Mean for Fifty-seven Years 1875-1931		
	Rain-fall	Rain-fall collected	Per Cent. collected	Rain fall	Rain-fall collected	Per Cent. collected	Rain-fall	Rain-fall collected	Per Cent. collected	Rain-fall	Rain-fall collected	Per Cent. collected
January . . .	3.99	2.349	58.9	2.62	1.113	42.4	3.95	.832	21.0	3.94	1.974	50.2
February . . .	3.84	2.434	63.3	2.52	1.515	60.1	2.57	1.643	64.3	3.99	2.489	62.4
March . . .	3.14	4.751	151.5	3.84	2.584	67.4	5.89	6.159	104.5	4.18	4.756	113.6
April . . .	7.30	5.070	69.4	2.06	1.709	83.0	3.12	3.349	107.5	3.65	3.387	92.9
May . . .	3.65	3.199	87.6	3.07	.722	23.5	3.97	2.120	54.8	3.26	1.965	60.3
June . . .	1.65	.394	23.9	1.62	.077	4.8	7.18	3.405	47.4	3.31	.913	27.6
July . . .	0.90	— .198	— 21.9	4.08	— .041	— 1.0	1.66	.557	33.5	3.65	.373	10.2
August . . .	2.14	— .105	— 4.9	2.49	— .147	— 5.9	4.93	.229	4.6	3.83	.396	10.4
September . . .	2.11	— .043	— 2.1	0.81	— .313	— 38.5	1.19	— .176	— 14.8	3.27	.395	12.1
October . . .	2.85	.097	3.4	4.37	.052	1.2	2.23	— .048	— 2.1	3.58	.664	18.5
November . . .	2.97	.439	14.8	4.36	.860	19.7	0.95	.074	7.8	3.81	1.298	34.1
December . . .	4.08	.630	15.5	2.56	.251	9.8	3.29	.532	16.1	3.77	1.704	45.2
Totals and averages . . .	38.62	19.017	49.2	34.40	8.383	24.4	40.83	18.682	45.7	44.24	20.314	45.9

The following table gives the record of the yield of the Sudbury River watershed in gallons per day per square mile for each of the past six years and the mean for the past fifty-seven years:

*Yield of the Sudbury River Drainage Area in Gallons per Day per Square Mile*

MONTH	1926	1927	1928	1929	1930	1931	Mean for Fifty-seven Years, 1875-1931
January . . .	863,000	1,297,000	1,305,000	1,317,000	624,000	466,000	1,107,000
February . . .	991,000	1,462,000	1,645,000	1,511,000	940,000	1,024,000	1,532,000
March . . .	2,726,000	2,054,000	1,275,000	2,664,000	1,449,000	3,453,000	2,666,000
April . . .	1,927,000	692,000	1,760,000	2,941,000	991,000	1,943,000	1,962,000
May . . .	720,000	768,000	1,414,000	1,793,000	405,000	1,188,000	1,102,000
June . . .	104,000	215,000	1,585,000	228,000	45,000	1,972,000	529,000
July . . .	— 68,000	130,000	1,217,000	— 111,000	— 23,000	312,000	209,000
August . . .	233,000	946,000	550,000	— 59,000	— 83,000	129,000	222,000
September . . .	— 113,000	1,307,000	594,000	— 25,000	— 181,000	— 102,000	229,000
October . . .	114,000	1,297,000	526,000	54,000	29,000	— 27,000	372,000
November . . .	803,000	4,026,000	589,000	254,000	498,000	43,000	752,000
December . . .	670,000	2,764,000	841,000	353,000	141,000	298,000	955,000
Average for whole year . . .	746,000	1,411,000	1,105,000	905,000	399,000	889,000	967,000
Average for driest six months . . .	167,000	676,000	721,000	55,000	33,000	110,000	384,000

The drainage area of the Sudbury River used in making up these records included water surfaces amounting to about 2 per cent of the whole area from 1875 to 1878, inclusive, subsequently increasing by the construction of storage reservoirs to about 3 per cent in 1879, to 3.5 per cent in 1885, to 4 per cent in 1894, and to 6.5 per cent in 1898. The drainage area also contains extensive areas of swampy land, which, though covered with water at times, are not included in the above percentages of water surfaces.

*Nashua River*

The average yield of the South Branch of the Nashua River at the outlet of the Wachusett Reservoir in Clinton during the year 1931 was 972,000 gallons per day per square mile of drainage area, or about 90.5 per cent of the average for the past 35 years.

The average yield for the six driest months, July to December, inclusive, was 428,000 gallons per day per square mile, or 77 per cent of the normal.

The months of January, February, November and December were very deficient, the actual yield being only about half the normal. The months of March, April, June and August were somewhat in excess of the normal. From the Ware River watershed 12,920.9 million gallons were diverted to the Wachusett Reservoir but this reservoir lacked 6.21 feet of filling during the year.

The following table shows the normal yield of the river by months for the past 35 years, the actual yield in the year 1931, and the excess or deficiency in each month. The drainage area of the Nashua River above the point of measurement was 119 square miles from 1897 to 1907 and 118.19 square miles from 1908 to 1913, inclusive. Since January 1, 1914, the city of Worcester has been diverting water from 9.35 square miles of this drainage area for the supply of that city, leaving the net drainage area 108.84 square miles.



Table showing the Average Daily Yield of the South Branch of the Nashua River for Each Month in the Year 1931, in Cubic Feet per Second per Square Mile of Drainage Area, and in Million Gallons per Day per Square Mile of Drainage Area; also, Departure from the Normal.

MONTH	NORMAL YIELD		ACTUAL YIELD IN 1931		EXCESS OR DEFICIENCY	
	Cubic Feet per Second per Square Mile	Million Gallons per Day per Square Mile	Cubic Feet per Second per Square Mile	Million Gallons per Day per Square Mile	Cubic Feet per Second per Square Mile	Million Gallons per Day per Square Mile
January . . . . .	1.762	1.139	.764	.494	— .998	— .645
February . . . . .	1.982	1.281	1.059	.685	— .923	— .596
March . . . . .	3.926	2.538	3.942	2.548	+ .016	+ .010
April . . . . .	3.376	2.182	3.591	2.321	+ .215	+ .139
May . . . . .	2.018	1.304	1.959	1.266	— .059	— .038
June . . . . .	1.299	.840	2.768	1.789	+1.469	+ .949
July . . . . .	.731	.473	.602	.389	— .129	— .084
August . . . . .	.655	.423	.939	.607	+ .284	+ .184
September . . . . .	.574	.371	.463	.299	— .111	— .072
October . . . . .	.699	.452	.423	.273	— .276	— .179
November . . . . .	1.199	.775	.489	.316	— .710	— .459
December . . . . .	1.727	1.116	1.049	.678	— .678	— .438
Average for whole year	1.660	1.073	1.504	.972	— .156	— .101

The rainfall on the Nashua River watershed and the total yield expressed in inches in depth upon the watershed (inches of rainfall collected) for each of the past six years, 1926 to 1931, inclusive, together with the average for the past 35 years, are given in the following table:

Rainfall, in Inches, received and collected on the Nashua River Drainage Area

MONTH	1926			1927			1928		
	Rain-fall	Rain-fall collected	Per Cent collected	Rain-fall	Rain-fall collected	Per Cent collected	Rain-fall	Rain-fall collected	Per Cent collected
January . . . . .	2.64	1.695	64.1	3.34	2.184	65.5	3.03	2.657	87.7
February . . . . .	5.77	1.340	23.2	4.63	1.784	38.6	3.92	3.014	77.0
March . . . . .	2.92	3.366	115.1	1.71	4.167	244.4	2.08	2.291	110.3
April . . . . .	2.46	4.165	169.4	2.10	1.669	79.7	5.30	3.679	69.4
May . . . . .	2.00	1.471	73.6	3.04	1.623	53.3	2.92	2.946	100.8
June . . . . .	2.05	.699	34.2	2.17	.742	34.2	6.64	3.575	53.8
July . . . . .	2.93	.461	15.7	5.94	.997	16.8	4.75	1.627	34.2
August . . . . .	2.90	.449	15.5	9.48	2.875	30.3	5.07	1.179	23.2
September . . . . .	1.43	.347	24.2	3.51	2.086	59.4	3.83	1.117	29.1
October . . . . .	4.69	.691	14.7	5.02	1.972	39.2	1.99	.710	35.7
November . . . . .	5.32	1.512	28.4	7.50	4.521	60.3	2.40	.776	32.4
December . . . . .	4.20	1.162	27.7	6.23	4.552	73.0	2.08	1.199	57.6
Totals and averages . . . . .	39.31	17.358	44.2	54.67	29.172	53.4	44.01	24.770	56.3

Rainfall, in Inches, received and collected on the Nashua River Drainage Area—Cont.

MONTH	1929			1930			1931			Mean for Thirty-five Years 1897-1931		
	Rain-fall	Rain-fall collected	Per Cent collected	Rain-fall	Rain-fall collected	Per Cent collected	Rain-fall	Rain-fall collected	Per Cent collected	Rain-fall	Rain-fall collected	Per Cent collected
January . . . . .	4.80	2.140	44.5	2.11	1.156	54.8	3.44	.881	25.6	3.61	2.031	56.2
February . . . . .	4.28	2.310	54.0	2.20	1.396	63.5	2.71	1.103	40.7	3.79	2.079	54.9
March . . . . .	3.40	4.912	144.5	3.65	2.146	58.7	5.00	4.545	90.9	3.93	4.526	115.2
April . . . . .	5.83	4.953	84.9	1.88	1.646	87.8	2.98	4.001	134.2	3.85	3.767	97.9
May . . . . .	4.62	3.851	83.3	2.77	1.039	37.5	5.01	2.258	45.1	3.36	2.326	69.3
June . . . . .	3.09	1.020	33.0	2.96	.773	26.1	6.07	3.089	51.0	3.87	1.449	37.5
July . . . . .	.85	.265	31.2	5.72	.808	14.1	2.71	.694	25.6	4.07	.843	20.7
August . . . . .	1.50	.125	8.4	1.69	.399	23.5	6.95	1.083	15.6	4.05	.755	18.6
September . . . . .	2.00	.272	13.6	1.91	.406	21.3	2.04	.517	25.3	3.49	.641	18.4
October . . . . .	3.12	.427	13.7	3.55	.655	18.4	2.46	.487	19.8	3.21	.805	25.1
November . . . . .	3.14	.630	20.1	3.92	.810	20.7	1.35	.546	40.5	3.67	1.338	36.4
December . . . . .	3.30	.739	22.4	2.61	.661	25.4	3.63	1.209	33.3	3.94	1.991	50.6
Totals and averages . . . . .	39.93	21.644	54.2	34.97	11.895	34.0	44.35	20.413	46.0	44.84	22.551	50.3

The following table gives the record of the yield of the Nashua River watershed in gallons per day per square mile for each of the past six years and the mean for the past 35 years.

*Yield of the Nashua River Drainage Area in Gallons per Day per Square Mile*

MONTH	1926	1927	1928	1929	1930	1931	Mean for Thirty- five Years, 1897-1931
January . . . . .	951,000	1,224,000	1,490,000	1,200,000	648,000	494,000	1,139,000
February . . . . .	831,000	1,108,000	1,806,000	1,434,000	867,000	685,000	1,281,000
March . . . . .	1,887,000	2,336,000	1,284,000	2,754,000	1,203,000	2,548,000	2,538,000
April . . . . .	2,416,000	968,000	2,134,000	2,873,000	955,000	2,321,000	2,182,000
May . . . . .	825,000	910,000	1,651,000	2,159,000	583,000	1,266,000	1,304,000
June . . . . .	405,000	430,000	2,071,000	591,000	448,000	1,789,000	840,000
July . . . . .	258,000	559,000	912,000	148,000	453,000	389,000	473,000
August . . . . .	252,000	1,612,000	661,000	70,000	224,000	607,000	423,000
September . . . . .	201,000	1,207,000	646,000	157,000	235,000	299,000	371,000
October . . . . .	387,000	1,105,000	398,000	239,000	367,000	273,000	452,000
November . . . . .	876,000	2,619,000	450,000	365,000	469,000	316,000	775,000
December . . . . .	651,000	2,552,000	672,000	414,000	371,000	678,000	1,116,000
Average for whole year . . . . .	826,000	1,389,000	1,176,000	1,031,000	566,000	972,000	1,073,000
Average for driest six months . . . . .	389,000	949,000	624,000	232,000	353,000	428,000	554,000

The drainage area used in making up these records included water surfaces amounting to 2.2 per cent of the whole area from 1897 to 1902, inclusive, to 2.4 per cent in 1903, to 3.6 per cent in 1904, to 4.1 per cent in 1905, to 5.1 per cent in 1906, to 6 per cent in 1907, to 7 per cent in 1908, 1909 and 1910, to 6.5 per cent in 1911, to 6.8 per cent in 1912, to 7 per cent in 1913, to 7.4 per cent in 1914 and 1915, to 7.6 per cent in 1916, to 7.4 per cent in 1917 and 1918, to 7.5 per cent in 1919, 1920, 1921 and 1922, to 7.4 per cent in 1923 and 1924, to 6.4 per cent in 1925, to 5.9 per cent in 1926, to 5.7 per cent in 1927, to 7.6 per cent in 1928, to 7.4 per cent in 1929, to 5.6 per cent in 1930, and 6.0 per cent in 1931.

### *Merrimack River*

The Merrimack River is the second in size of the streams of Massachusetts. The river rises in the White Mountains of New Hampshire and flows southerly through the central part of that State until it enters Massachusetts, where it turns to the east and flows in a general northeasterly direction the remainder of its course to the sea. The total length of its watershed from its extreme northerly limits in the mountains of northern New Hampshire to its extreme southerly limits in the hills of Hopkinton, Massachusetts, is about 137 miles and its extreme width about 66 miles. Its total drainage area above its mouth at Newburyport is about 5,000 square miles, of which about one-quarter is within the limits of Massachusetts and the remainder within the State of New Hampshire.

Records of the flow of the Merrimack River have been kept continuously at Lawrence since 1880. The drainage area of the river at that point is 4,663 square miles, including 118.19 square miles tributary to the South Branch of the Nashua River used for the water supply of the Metropolitan District and in part for the city of Worcester, 75.2 square miles on the Sudbury River, and 18 square miles tributary to Lake Cochituate. The flow as measured at Lawrence includes the water wasted from these drainage areas. In presenting the record of the flow of the river these drainage areas have been deducted, leaving the net drainage area above Lawrence 4,567 square miles in 1880, 4,570 square miles in the years 1891 to 1897, inclusive, and 4,452 square miles since the latter year. The quantity of water overflowing from the Cochituate and Sudbury watersheds as measured by the Metropolitan District Commission has also been deducted from the flow of the river as measured at Lawrence. The average flow of the river during the year 1931 amounted to 1.174 cubic feet per second per square mile, or 758,700 gallons per day per square mile of drainage area, which is about 81% of the normal for the past 52 years. The flow was more than the normal during the months of April and June only. The greatest deficiency occurred in March.

The following table shows the relation between the normal flow of this stream during the past 52 years and the actual flow during each month of the year 1931.

*Table showing the Average Monthly Flow of the Merrimack River at Lawrence for the Year 1931, in Cubic Feet per Second per Square Mile of Drainage Area; also, Departure from the Normal.*

MONTH	Normal Flow, 1880-1931	Actual Flow in 1931	Excess or Deficiency
January	1.244	.423	— .821
February	1.329	.478	— .851
March	2.725	1.603	— 1.122
April	3.487	3.665	+ .178
May	2.239	1.897	— .342
June	1.270	2.207	+ .937
July	.765	.756	— .009
August	.652	.520	— .132
September	.643	.471	— .172
October	.777	.471	— .306
November	1.116	.621	— .495
December	1.265	.973	— .292
Average for whole year	1.459	1.174	— .285

The following table gives the record of the flow of the Merrimack River at Lawrence for each of the past six years, together with the average flow for the past 52 years, this amount being expressed in cubic feet per second per square mile of drainage area:

*Flow of the Merrimack River at Lawrence in Cubic Feet per Second per Square Mile*

MONTH	1926	1927	1928	1929	1930	1931	Mean for Fifty-two Years, 1880-1931
January	1.027	.955	2.039	1.537	.861	.423	1.244
February	.796	1.047	2.069	1.487	.949	.478	1.329
March	1.648	3.161	2.048	3.649	2.242	1.603	2.725
April	3.933	1.828	3.437	3.993	2.035	3.665	3.487
May	2.165	1.417	3.160	3.424	1.172	1.897	2.239
June	.843	.785	2.300	.973	1.055	2.207	1.270
July	.527	.645	1.636	.583	.521	.756	.765
August	.405	.708	1.550	.400	.520	.520	.652
September	.341	.949	1.500	.365	.378	.471	.643
October	.509	1.355	.977	.408	.311	.471	.777
November	1.395	3.733	.979	.409	.562	.621	1.116
December	.872	3.015	1.115	.488	.518	.973	1.265
Average for whole year	1.205	1.633	1.901	1.484	.927	1.174	1.459
Average for driest six months	.670	.977	1.293	.457	.468	.635	.870

### *Sudbury, Nashua and Merrimack Rivers*

The following table shows the weekly fluctuations during the year 1931 in the yield of the Sudbury River at Framingham, the South Branch of the Nashua River at the outlet of the Wachusett Reservoir in Clinton, and the Merrimack River at Lawrence. The flow of these streams, particularly that of the Sudbury River and the South Branch of the Nashua River, serves to indicate the flow of other streams in eastern Massachusetts. The area of the Sudbury River watershed is 75.2 square miles, of the South Branch of the Nashua River 118.19 square miles, and of the Merrimack River at Lawrence 4,452 square miles.



*Table Showing the Average Weekly Flow of the Sudbury, South Branch of the Nashua and the Merrimack Rivers for the Year 1931, in Cubic Feet per Second per Square Mile of Drainage Area.*

WEEK ENDING SUNDAY —	Yield of Sudbury River	Yield of South Branch Nashua River	Flow of Merrimack River	WEEK ENDING SUNDAY —	Yield of Sudbury River	Yield of South Branch Nashua River	Flow of Merrimack River
Jan. 4 . . .	.151	.504	.403	July 5 . . .	3.397	.395	.723
11 . . .	1.016	.970	.476	12 . . .	1.335	1.388	.727
18 . . .	.719	.707	.464	19 . . .	1.341	.500	.725
25 . . .	.852	.766	.371	26 . . .	1.018	.366	.980
Feb. 1 . . .	.546	.766	.409	Aug. 2 . . .	1.935	.150	.596
8 . . .	.496	.662	.390	9 . . .	— .010	.331	.486
15 . . .	.902	.874	.399	16 . . .	.633	1.498	.622
22 . . .	3.157	1.698	.557	23 . . .	.024	.495	.569
Mar. 1 . . .	3.760	1.095	.596	30 . . .	.382	1.745	.445
8 . . .	2.796	1.824	.693	Sept. 6 . . .	— .045	.662	.493
15 . . .	8.003	2.863	1.295	13 . . .	— .143	.306	.467
22 . . .	4.761	2.726	1.310	20 . . .	— .163	.683	.367
29 . . .	5.136	7.190	2.351	27 . . .	.036	.313	.469
Apr. 5 . . .	6.714	8.538	4.839	Oct. 4 . . .	.040	.256	.557
12 . . .	3.818	4.375	4.844	11 . . .	.271	.292	.448
19 . . .	4.363	1.956	3.898	18 . . .	.043	.620	.327
26 . . .	4.422	2.020	2.100	25 . . .	.047	.379	.528
May 3 . . .	3.883	1.819	2.214	Nov. 1 . . .	.120	.504	.669
10 . . .	4.121	1.868	1.561	8 . . .	.449	.281	.667
17 . . .	3.046	2.564	2.192	15 . . .	1.358	.456	.481
24 . . .	2.306	1.979	1.626	22 . . .	.219	.707	.720
31 . . .	2.621	1.619	2.238	29 . . .	1.208	.433	.576
June 7 . . .	2.711	.876	1.252	Dec. 6 . . .	.372	.779	.515
14 . . .	7.435	7.635	3.897	13 . . .	.366	.976	.485
21 . . .	4.744	2.300	2.683	20 . . .	.505	1.080	.920
28 . . .	2.802	.905	1.314	27 . . .	.892	1.549	1.670

#### EXAMINATION OF RIVERS

The increase in rainfall during the middle of the year and the decrease in industrial activity in certain parts of the State have resulted in an improvement in the sanitary condition of many of the rivers and streams.

The principal rivers of the State have been examined during the past year, and samples of water have been collected for analysis from the more important streams at the usual points as in previous years. The examinations have been confined to the drier part of the year—June to November, inclusive.

#### *Aberjona River*

Action in accordance with Chapter 291 of the Acts of 1911 against certain industrial concerns on this stream, instituted at the request of the Department by the Attorney-General some time ago, resulted during the year in an indictment against one of the tanneries. The sewer which the city of Woburn reconstructed in 1929 and 1930 has been connected with the Metropolitan sewerage system and is now in use, and at the end of the year the city of Woburn was extending a connection to one of the larger tanneries, the wastes from which are still a serious source of pollution to the river. The results of the analyses of samples of water from the river continue to show pollution in parts of its course. There is evidence of more pollution in the stream than in 1930, but in general the pollution was less than in the years previous to 1930.

#### *Assabet River*

The results of the analyses show a gradual improvement in the condition of this stream at nearly all points except below the sewage disposal works at Hudson. The improvement has been due in part at least to changes at the sewage disposal works at Westborough and the Massachusetts Reformatory at Concord and to the new works at Maynard.

A complaint relative to the condition of the river below Hudson was received by the Department during the early summer, and special examinations of the river at this point were made during the year.

#### *Blackstone River*

In connection with the investigation of the Department of Public Health and the Metropolitan District Water Supply Commission, acting jointly as authorized under Chapter 66 of the Resolves of 1931 (see House Document No. 402 of the Legislature of 1932) the Blackstone River has been carefully examined.

Kettle Brook, one of the principal tributaries of the Blackstone River, in the upper part of its course has shown considerable improvement in its condition due to the suspension of work at some of the industrial plants from which wastes are discharged. The condition of the Blackstone River below Worcester, both above and below the sewage disposal works of that city, has shown a slight improvement as compared with earlier years. Below Millbury the condition of the river also has shown an improvement, and at Northbridge, Uxbridge and Millville the results of the analyses have shown considerable improvement during the past year. The examinations of the river below Worcester and below Millbury have continued to show the presence of considerable quantities of iron, tar and oil.

#### *Charles River*

The Metropolitan District Commission and the Department of Public Health, acting as a joint board as authorized under the provisions of Chapters 20 and 40 of the Resolves of 1931, have made an investigation of the Charles River and the Charles River Basin, and the results are reported respectively in House Documents Nos. 158 and 159 of the Legislature of 1932. The condition of this stream below Milford has continued to show some evidence of pollution, although a slight improvement has been noted in the results of the analyses, and the same statement applies to Mine Brook, one of the upper tributaries below the Franklin sewage filters. The river below Medway, while still objectionable, has shown some improvement over previous years. Below Medfield and throughout the rest of its course to the Charles River Basin the condition of the river as shown by the results of the analyses was about the same as in recent years. Complaint was made in the fall of the pollution of the stream by industrial wastes in West Medway, and the matter was under consideration at the end of the year.

#### *Chicopee River*

Samples of the water of the Chicopee River were taken at Chicopee Falls by representatives of the Department during the months of June to November, inclusive, and the analyses show that the river was in a satisfactory condition at the time of each examination, the lowest dissolved oxygen determination being 52.5 per cent of saturation. The three tributaries of this stream, the Quaboag, Ware and Swift rivers, join to form the Chicopee River at Three Rivers. The Quaboag River appears to have been in a satisfactory condition at the time the samples were collected. The condition of the Ware River is referred to in the special report of the Department of Public Health and the Metropolitan District Water Supply Commission, House Document No. 402 of the Legislature of 1932. The results of the analyses show some evidence of pollution above and below Ware, but this tributary was not in an offensive condition at any time when examined during the past year.

#### *Concord and Sudbury Rivers*

During the past year, although there was an increase in rainfall in the early part of the year and the tunnel from the Ware River to the Wachusett Reservoir was completed and put into use, about the usual amount of water was diverted from the Sudbury River above the lowest dam for the use of the Metropolitan Water District.

Bannister Brook, one of the tributaries of the Sudbury River which enters the river near Saxonville, receives the effluent from the sewage filter beds of the towns of Framingham and Natick, and at times more or less sewage finds its way into this stream. The results of the analyses of samples of water collected during the year show a slight improvement in the condition of this brook. Below Saxonville the condition of the river has shown a slight increase in pollution over the previous year.

The Concord River below the junction of its principal tributaries, the Sudbury and Assabet rivers, has shown but little change during the year but at its mouth at Lowell a slight improvement in the condition of the stream was noticeable.

#### *Connecticut River*

The Connecticut River has shown an improvement in its condition over recent years. The banks below some of the sewer outlets were offensive, but in general

the river has shown no material evidence of pollution at any point in its course in Massachusetts. Mill River and the Manhan River, small tributaries, are polluted by sewage, and the average dissolved oxygen in the water of these rivers at their outlets has been 28.8 per cent and 46.6 per cent of saturation respectively. Mill River has been in an offensive condition due to the discharge of sewage from the city of Northampton. A communication was sent to the Sewer Commissioners of Northampton during the year recommending the removal of the sewage from Mill River.

#### *French River*

The French River is very badly polluted at Webster and Dudley by domestic sewage and industrial wastes discharged directly to the stream. The condition of the river in 1930 was more objectionable than for a number of years, but during the past year, according to the analyses, its condition has been somewhat more satisfactory due evidently to a larger runoff and to the discharge of smaller quantities of industrial wastes.

#### *Hoosick River*

The question of the pollution of the Hoosick River has received much consideration during the year by interested citizens in North Adams and Williamstown, and under date of October 26, 1931, the Department urged the towns of Adams and Williamstown and the city of North Adams to consider the matter of a joint sewerage system and sewage disposal works. This question has been before the public periodically for many years and, while it is probably not practicable to finance complete works at present, the time seems to have arrived for definite studies and estimates of suitable works for removing the bulk of the pollution from this stream. There is a local demand for additional sewers in parts of North Adams, and the Department has been unable to recommend the adoption of any plan thus far proposed.

The analyses show a gradual increase in the amount of pollution; in fact they show more serious pollution at Williamstown than in any recent year.

#### *Housatonic River*

The results of the analyses of samples of the water of the Housatonic River have shown in most cases a slight improvement in its condition due largely to the small amount of industrial waste discharged into this stream. The river below the Pittsfield sewage pumping station, however, has shown a slight increase in pollution. The effect of the poorly purified effluent of the Pittsfield sewage disposal works and crude sewage discharged therefrom is noted for a considerable distance below Pittsfield, and while a start has been made in improving the Pittsfield sewerage works much remains to be done by that city to prevent objectionable conditions in this stream.

#### *Merrimack River*

In accordance with the provisions of Chapter 202 of the Acts of 1929, the Department of Public Health has investigated the condition of the Merrimack River and the pollution thereof within the limits of the Commonwealth. This investigation indicates in general a slight decrease in pollution in that portion of the stream from Lowell to the sea due, no doubt, to an increase in the flow of the stream and a decrease in the industrial activities in this valley. The analyses indicate no material change in the condition of this stream.

#### *Nashua River*

There has been an improvement in the condition of the North Branch of the Nashua River above the Fitchburg sewage disposal works due apparently to a decrease in the discharge of industrial wastes into the stream. At the point where the river enters Leominster a slight improvement has also been noted. During the past year much of the sewage formerly discharged by the city of Leominster into Monoosnock Brook has been diverted to the sewage disposal works near Mechanic Street which has effected an improvement in the condition of the water of Monoosnock Brook. A slight improvement in the river has been noted below Leominster due to the decrease in industrial activity in this valley, but nevertheless the river at this point has been in a more objectionable condition than at most any time up to 1929 and 1930, and at its mouth in Lancaster this branch of the river, according



to the analyses, has contained more putrescible organic matter than in any year since the records were started in 1892 with the exception of the year 1911.

The legislation proposed a year ago relative to the treatment of Leominster sewage failed of enactment, but during the year the town of Lancaster brought suit against the city of Leominster, and this matter is now in litigation.

The Department found it necessary during the year to call the attention of the Leominster authorities to the fact that the river is seriously polluted by sewage from that city and has recommended that the city proceed forthwith with the preparation of construction plans for adequate sewage disposal works.

Little change was noted in the condition of the South Branch of the river above and below Clinton and in the main stream throughout the remainder of its course during the year, though there has been an indication of a slight improvement due apparently to the decrease in the quantity of industrial wastes discharged into the stream.

#### *Neponset River*

The Metropolitan sewer extension to take care of the sewage from the towns of Norwood, Walpole, Stoughton and Canton was nearing completion at the end of the year, all of the construction work being under contract. Presumably this sewer will be available during the coming year for the large amount of domestic sewage and industrial wastes now entering this stream. The analyses during the year 1931 have shown a slight improvement, a condition probably due to a decrease in industrial activity, but the stream has continued to be seriously polluted throughout much of its course.

#### *North River*

The North River in Peabody and Salem has shown more evidence of pollution than in 1930, and the samples collected at its mouth in June, July and August had an average of 33.95 parts in 100,000 of suspended solids. The river was devoid of oxygen when the samples were collected in July, August and November and contained but little oxygen when the other samples were collected. Legislation relative to an investigation of the pollution of this stream proposed during the early part of the year failed of enactment.

#### *Taunton River*

The only important change noted in the past year in the Taunton River and its tributaries has been in the Salisbury Plain River below Brockton where an increase in pollution was noticeable. This apparently was due in part at least to an increase in the quantity of gas works wastes discharged into this river. Mill River at its mouth in Taunton has shown an increase in sewage pollution during the past year.

The examinations of the other streams have shown no particular changes during the past year.

### MUNICIPAL SEWAGE DISPOSAL WORKS

All of the sewage disposal works have been examined during the year, and samples have generally been collected of the sewage, settled sewage and effluent at frequent intervals.

The works at Attleboro, Concord, Hopedale, Marion, Marlborough, Milford, Northbridge and Winchendon appear to require no particular comment.

At Brockton the works are operated under local laboratory control with good results.

At Clinton a considerable portion of the sewage has been allowed to overflow either from the pumping station or the filter beds with little or no treatment, and when the sewage is treated the effluent has contained more iron on the average than in any recent year and has not shown evidence of being well purified. These sewage disposal works are of inadequate capacity, and their further enlargement or some new form of treatment is necessary in order to prevent offensive conditions in the vicinity of these works.

At Easthampton much of the sewage has been allowed to overflow without treatment, and the portion that is filtered has been none too well purified.

The Fitchburg sewage disposal works have been operated under expert supervision, and the analyses show that the final effluent has been well purified. Some-

time ago arrangements were made to discharge the sewage from a limited portion of the city of Leominster into the Fitchburg main sewer, and while permission has been obtained, plans approved and the connection made, no Leominster sewage has as yet been conveyed to the Fitchburg disposal works.

The sewage disposal works at Framingham have been operated with reasonable satisfaction, and the analyses of the effluent from the new sand filters show that the sewage discharged to this portion of the works has been well purified. The effluent from the older portion of the works has contained excessive quantities of iron. It has been necessary to allow a limited quantity of sewage to overflow without treatment.

At Franklin the sewage has not been well purified. The operation of this plant requires greater attention, especially in connection with the distribution of the sewage over more of the area each day.

At the larger works in Gardner, known as the Templeton area, additional filter beds having an aggregate area of four acres were nearly ready for use at the end of the year 1930, but only about 1  $\frac{1}{2}$  acres of this new area have been put into use during the year. This small increase in area has effected a slight improvement in the quality of the effluent, but the new works should be put into use at the earliest possible time. The effect of this effluent has been noticeable in the Otter River into which it is discharged. Suitable means for measuring the quantity of sewage should be provided at these works.

At Hudson the sewage has contained a large amount of organic matter and has not been well purified. It is proposed to make a special examination of this plant during the coming year.

The small disposal works at Leicester are not producing satisfactory results, and considerable quantities of sewage have been allowed to overflow without treatment.

At Leominster larger quantities of sewage have been conveyed to the small experimental plant which have caused it to be badly overloaded. The effluent is of very poor quality and as indicated in another portion of this report the necessity of providing adequate sewage disposal works has been brought to the attention of the authorities during the year.

The new plant at Maynard has operated satisfactorily during the year.

At Nantucket the new sewage disposal works have been in operation throughout the year, but the sewage has not always been well distributed, and the sludge collected on the beds, together with considerable quantities of sand, has been removed. It is desirable that the sewage be more thoroughly distributed over these filters each day.

The sewage of the town of Natick has not been well purified, and it is desirable that a larger area of filters be provided.

The inspections and analyses made in connection with the sewage disposal works at North Attleborough show a slight improvement due to the enlargement of these works in 1930. One of the old beds was reconstructed in 1931, and this work of reconstructing the filters should be completed in order to place this plant in proper condition.

The efficiency of the Norwood sewage disposal works has fallen off during the year, but the Metropolitan sewer will probably be available for the sewage of this town during the coming year.

The analyses of samples taken in connection with the sewage disposal works at Pittsfield show poorer results than at any time since the works were first put into operation in 1901. Much sewage has been allowed to overflow into the Housatonic River without treatment, and offensive odors have been noted near the sewage disposal works. The improvement of the basins at the sewage pumping station under plans approved in 1930 has been started but no improvement has been effected at the disposal works.

At Southbridge the effluent has shown a slight improvement, but it has contained considerable iron, and much sewage has been allowed to overflow.

At Spencer considerable quantities of sewage have been allowed to overflow without treatment, though the analyses indicate a slight increase in efficiency of the treatment of that portion of the sewage filtered.

At Westborough the work of reconstructing one of the filter beds has been finished, and an additional bed has been constructed with an area of 0.46 of an

acre. The analyses indicate a considerable improvement in the efficiency of these works.

The sewage disposal works at Worcester have been very carefully examined by the Department during the past year in connection with its investigation reported in House Document No. 402 of the Legislature of 1932. This plant is operated under expert management, and the analyses of samples show that the objectionable condition of the Blackstone River due to industrial wastes discharged into the stream in Worcester is improved somewhat by dilution with the sewage effluent.

The results of the analyses and the records of the operations of the larger municipal sewage disposal works are given in the appended tables.



TABLE NO. 1.—Average Results of the Analyses of Monthly Samples of Sewage as received at Disposal Works. (Fats determined in about 54 per cent of the Samples)  
[Parts in 100,000]

CITY OR TOWN	RESIDUE ON EVAPORATION						AMMONIA			Chlorine	OXYGEN CONSUMED		IRON		Kjeldahl Nitrogen	Fats	
	TOTAL RESIDUE			LOSS ON IGNITION			Free	ALBUMINOID			Unfil-tered	Fil-tered	Unfil-tered	Fil-tered			
	Total	Dis-solved	Sus-pended	Total	Dis-solved	Sus-pended											
ATTLEBORO <sup>1</sup>	32.13	26.60	5.53	15.30	10.63	4.67	2.62	.41	.26	.15	3.21	2.46	.165	.088	.98	—	
BROCKTON <sup>2</sup>	46.91	30.55	16.36	27.05	12.29	14.76	4.40	.59	.32	.27	6.00	2.97	.156	.062	1.55	6.07	
Clinton <sup>2</sup>	105.23	61.77	43.46	65.18	30.32	34.86	3.36	.93	.57	.36	10.97	6.85	.307	.121	2.60	23.85	
Concord <sup>1</sup>	31.00	18.63	12.67	17.87	6.73	11.14	1.24	.19	.12	.07	2.19	1.53	.152	.043	.52	—	
Easthampton <sup>1</sup>	66.86	34.86	32.00	46.33	16.53	29.80	3.68	.46	.28	.18	8.40	3.87	.104	.044	1.19	—	
FITCHBURG	44.97	25.85	19.12	24.55	11.19	13.36	1.99	.38	.24	.14	5.20	2.98	.307	.117	1.01	8.77	
Framingham <sup>2</sup> (Imhoff) <sup>3</sup>	74.35	48.33	26.02	41.62	21.27	20.35	5.52	.90	.58	.32	7.98	4.43	.235	.084	2.09	10.71	
Framingham <sup>2</sup>	85.10	49.80	35.30	50.72	23.42	27.30	4.66	1.12	.70	.42	9.47	5.41	.274	.093	2.24	13.52	
Franklin <sup>1</sup>	38.67	28.00	10.67	21.02	12.20	8.82	3.47	.54	.32	.22	4.16	2.66	.085	.033	1.19	—	
GARDNER (Gardner Area) <sup>4</sup>	81.10	52.65	28.45	51.55	27.40	24.15	6.36	1.23	.75	.48	12.33	7.13	.190	.072	2.87	12.68	
GARDNER (Templeton Area)	70.85	44.87	25.98	43.00	20.42	22.58	8.82	1.20	.76	.44	9.44	5.02	.189	.065	2.71	10.99	
Hopedale <sup>1</sup>	72.40	47.43	24.97	46.50	24.97	21.53	4.61	1.04	.69	.35	10.18	5.79	.205	.051	2.52	—	
Hudson	61.00	42.03	18.97	35.15	19.57	15.58	7.30	1.01	.65	.36	7.76	4.52	.235	.105	2.21	10.21	
Leicester <sup>4</sup>	41.90	34.73	7.17	22.33	16.07	6.26	3.22	.50	.30	.20	4.17	2.99	.102	.052	1.32	—	
Marion <sup>1</sup>	24.88	20.72	4.16	12.72	9.04	3.68	1.66	.34	.22	.12	3.05	2.40	.094	.035	.74	—	
MARLBOROUGH	63.13	41.58	21.55	37.34	18.73	18.61	3.61	.86	.43	.43	5.33	3.96	.205	.079	1.87	12.88	
Maynard	94.27	36.52	57.75	68.18	18.27	49.91	7.09	1.39	.75	.64	4.78	4.84	.215	.071	3.28	—	
Milford	53.45	37.13	16.30	30.75	16.12	14.63	5.83	.68	.47	.21	6.84	4.08	.129	.049	1.76	—	
Natick <sup>2</sup>	38.69	29.22	9.47	17.75	10.27	7.48	2.60	.37	.20	.17	3.32	1.80	.091	.036	.95	5.75	
North Attleborough <sup>1</sup>	24.76	21.08	3.68	10.72	7.76	2.96	1.74	.32	.17	.15	2.46	2.44	.173	.063	.45	—	
Northbridge	46.50	31.90	14.60	28.47	15.58	12.89	4.68	.89	.58	.31	4.06	3.67	.145	.046	1.95	—	
Norwood	66.31	48.91	17.40	33.71	20.00	13.71	3.23	.57	.31	.26	10.63	5.06	.163	.075	1.37	7.38	
Pittsfield <sup>2</sup>	58.48	39.05	19.43	34.23	18.53	15.70	3.62	.69	.48	.21	3.79	4.39	.285	.047	1.75	6.59	
Southbridge <sup>1</sup>	69.97	43.13	26.84	41.97	20.27	21.70	6.64	1.14	.72	.42	5.21	9.08	.268	.081	2.39	12.48	
Spencer <sup>1</sup>	181.10	54.80	126.30	135.37	31.73	103.64	4.77	1.97	1.09	.88	5.73	7.98	.763	.098	6.70	24.35	
Stockbridge <sup>4</sup>	32.95	28.55	4.40	17.35	13.70	3.65	4.06	.37	.27	.10	2.04	3.26	.064	.033	.99	—	
Westborough	48.42	30.58	17.84	17.84	15.77	15.01	3.66	.66	.41	.25	2.87	6.45	.155	.046	1.72	8.85	
Winchendon <sup>4</sup>	71.47	34.67	36.80	48.27	17.47	30.80	3.75	1.18	.72	.46	3.27	9.43	.430	.240	2.93	—	
WORCESTER	77.31	50.25	27.06	30.48	13.55	16.93	2.29	.50	.17	.33	8.13	3.54	4.550	.671	1.40	6.18	

<sup>1</sup>Six samples.<sup>2</sup>At pumping station.<sup>3</sup>Entrance to Imhoff tanks, including Saxonville sewage.<sup>4</sup>Four samples.

TABLE No. 2.—Average Results of the Analyses of Monthly Samples of Sewage as Applied to Filter Beds after Preliminary Treatment as Indicated. (Fats determined in about 54 Per Cent of the Samples.)

[Parts in 100,000]

CITY OR TOWN	Form of Preliminary Treatment	RESIDUE ON EVAPORATION						AMMONIA			OXYGEN CONSUMED		IRON		Kjeldahl Nitrogen	Fats		
		TOTAL RESIDUE			LOSS ON IGNITION			Free	ALBUMINOID			Unfiltered	Filtered	Unfiltered			Filtered	
		Total	Dissolved	Suspended	Total	Dissolved	Suspended											
ATTLEBORO <sup>1</sup>	None	32.13	26.60	5.53	15.30	10.63	4.67	2.62	.41	.26	.15	2.77	3.21	2.46	.165	.088	.98	3.77
BROCKTON	Tanks	39.40	31.70	7.70	18.55	11.68	6.87	3.50	.41	.25	.16	4.96	4.19	2.52	.145	.068	1.07	6.83
CLINTON	Basins	49.64	43.44	6.20	23.53	18.26	5.27	2.70	.47	.33	.14	5.34	4.98	3.89	.255	.130	1.16	-
CONCORD <sup>1</sup>	None	31.00	18.33	12.67	17.87	6.73	11.14	1.24	.19	.12	.07	2.62	2.19	1.53	.152	.043	.52	-
EASTHAMPTON <sup>1</sup>	Tanks	46.93	36.40	10.53	26.73	16.93	9.80	3.81	.45	.29	.16	3.70	7.29	3.77	.071	.038	1.28	-
FRITCHBURG	Imhoff	28.87	26.37	2.50	12.95	11.42	1.53	2.30	.24	.17	.07	3.26	3.18	2.51	.193	.133	.66	3.20
FRAMINGHAM	Imhoff	45.27	39.50	5.77	20.30	16.33	3.97	4.56	.48	.34	.14	6.13	4.45	3.13	.145	.086	1.24	4.35
FRANKLIN <sup>1</sup>	Tanks	24.77	21.27	3.50	8.40	7.67	0.73	1.52	.19	.13	.06	2.64	1.42	1.24	.070	.037	.39	-
GARDNER (Gardner Area)	None	81.10	52.65	28.45	51.55	27.40	24.15	6.36	1.23	.75	.48	5.24	12.33	7.13	.190	.072	2.87	12.68
GARDNER (Templeton Area)	Tanks	42.50	36.37	6.13	20.65	15.23	5.42	6.06	.54	.38	.16	5.30	5.06	3.31	.142	.085	1.34	5.09
HOPEDALE <sup>1</sup>	Tanks	34.57	30.33	4.24	18.37	14.77	3.60	4.07	.41	.29	.12	3.50	4.14	2.75	.127	.072	1.03	-
HUDSON	Tanks	44.08	35.90	8.18	22.95	16.15	6.80	4.93	.52	.34	.18	5.28	4.47	2.92	.142	.076	1.29	5.46
LEICESTER <sup>2</sup>	None	41.90	34.73	7.17	22.33	16.07	6.26	3.22	.50	.30	.20	3.58	4.17	2.99	.102	.052	1.32	-
MARION <sup>1</sup>	Tanks	25.25	21.65	3.60	10.55	7.65	2.90	1.48	.24	.16	.08	3.81	2.02	1.52	.098	.060	.63	-
MARLBOROUGH	Tanks	52.93	45.23	7.70	27.55	20.55	7.00	4.50	.62	.42	.20	5.33	5.30	3.84	.197	.082	1.51	6.68
MAYNARD	Imhoff	36.11	31.71	4.40	17.66	14.66	3.00	4.93	.45	.30	.15	4.45	4.17	3.24	.099	.064	1.02	-
MILFORD	Tanks	43.43	39.35	4.08	20.23	16.60	3.63	3.63	.37	.24	.13	5.41	3.63	2.79	.112	.043	.96	-
MILFORD	Imhoff	38.83	31.95	6.88	18.03	12.10	5.93	3.88	.35	.21	.14	4.38	3.44	2.35	.104	.048	.92	-
NATICK	None	38.69	29.22	9.47	17.75	10.27	7.48	2.60	.37	.20	.17	3.45	3.32	1.80	.031	.036	.95	5.75
NORTH ATTLEBOROUGH <sup>1</sup>	Tanks	24.16	21.92	2.24	9.92	7.88	2.04	1.70	.28	.18	.10	2.28	3.31	1.93	.124	.055	.88	-
NORTHBRIDGE	Tanks	20.72	18.33	2.39	9.73	7.90	1.83	2.60	.29	.18	.11	2.35	2.26	1.59	.085	.049	.63	-
NORWOOD	Tank	51.33	41.35	9.98	23.46	16.47	6.99	2.59	.43	.27	.16	7.52	5.61	8.74	.114	.056	1.12	5.21
PRITTSFIELD	None	58.48	39.05	19.43	34.23	18.53	15.70	3.62	.69	.48	.21	3.79	7.24	4.39	.285	.047	1.75	6.59
SOUTHBURGH <sup>1</sup>	Tanks	45.70	38.77	6.93	24.27	18.20	6.07	3.85	.57	.45	.12	4.48	5.88	4.05	.163	.094	1.35	6.29
SPENCER <sup>1</sup>	None	181.10	54.80	126.30	135.37	31.73	103.64	4.77	1.97	1.09	.88	5.73	20.33	7.98	.763	.098	6.70	24.35
STOCKBRIDGE <sup>2</sup>	None	32.95	28.55	4.40	17.35	13.70	3.65	4.06	.37	.27	.10	2.04	3.26	2.24	.064	.033	.99	-
WESTBOROUGH	None	48.42	30.58	17.84	30.78	15.77	15.01	3.66	.66	.41	.25	2.87	6.45	3.62	.155	.046	1.72	8.85
WINCHESTON <sup>2</sup>	Tanks	38.60	29.40	1.20	12.65	11.90	0.75	3.30	.28	.18	.10	4.33	2.99	2.40	.187	.107	.61	-
WORCESTER	Imhoff	61.68	48.31	13.37	18.55	10.81	7.74	2.59	.29	.13	.16	8.88	5.44	2.82	5.097	1.492	.84	3.13

<sup>2</sup>Four samples.<sup>1</sup>Six Samples

TABLE No. 3.—*Efficiency of Settling Tanks and Other Forms of Preliminary Treatment as Indicated by the Foregoing Tables.*  
(Parts in 100,000)

CITY OR TOWN	Form of Preliminary Treatment	SUSPENDED SOLIDS			TOTAL ALBUMINOID AMMONIA			OXYGEN CONSUMED			FATS <sup>1</sup>			CHLORINE	
		Raw Sewage	Settled or treated Sewage	Per Cent removed	Raw Sewage	Settled or treated Sewage	Per Cent removed	Raw Sewage	Settled or treated Sewage	Per Cent removed	Raw Sewage	Settled or treated Sewage	Per Cent removed	Raw Sewage	Settled or treated Sewage
BROCKTON	.	16.36	7.70	53	.59	.41	31	6.00	4.19	30	6.07	3.77	38	4.68	4.96
Clinton	.	43.46	6.20	86	.93	.47	49	10.97	4.98	55	23.85	6.83	71	5.66	5.34
Easthampton	.	32.00	10.53	67	.46	.45	49	8.40	7.29	13	—	—	—	4.10	3.70
FITCHBURG	.	19.12	2.50	87	.38	.24	39	5.20	3.18	39	8.77	3.20	64	3.30	3.26
Framingham <sup>2</sup>	.	26.02	5.77	78	.90	.48	47	7.98	4.45	44	10.71	4.35	59	5.94	6.13
Franklin	.	10.67	3.50	67	.54	.19	65	4.16	1.42	66	—	—	—	2.97	2.64
GARDNER (Templeton Area)	.	25.98	6.13	76	1.20	.54	55	9.44	5.06	47	10.99	5.09	54	6.08	5.30
Hopedale	.	24.97	4.24	83	1.04	.41	61	10.18	4.14	59	—	—	—	4.37	3.50
Hudson	.	18.97	8.18	57	1.01	.52	49	7.76	4.47	42	10.21	5.46	47	5.55	5.28
Marion	.	4.16	3.60	13	.34	.24	29	3.05	2.02	34	—	—	—	3.18	3.81
MARLBOROUGH	.	21.55	7.70	64	.86	.62	28	7.05	5.30	25	12.88	6.68	48	5.33	5.33
Maynard	.	57.75	4.40	92	1.39	.45	68	11.45	4.17	64	—	—	—	6.08	4.45
Milford	.	16.30	4.08	75	.68	.37	46	6.84	3.63	47	—	—	—	4.71	5.41
Milford	.	16.30	6.88	58	.68	.35	49	6.84	3.44	50	—	—	—	4.71	4.38
North Attleborough	.	3.68	2.24	39	.32	.28	13	4.51	3.31	27	—	—	—	2.45	2.28
Northbridge	.	14.60	2.39	84	.89	.29	67	6.18	2.26	63	—	—	—	4.06	2.35
Norwood	.	17.40	9.98	43	.57	.43	25	8.36	5.61	33	7.38	5.21	29	10.63	7.52
Southbridge	.	26.84	6.93	74	1.14	.57	50	9.08	5.88	35	12.48	6.29	50	5.21	4.48
Winchendon	.	36.80	1.20	97	1.18	.28	76	9.43	2.99	68	—	—	—	3.27	4.33
Worcester	.	27.06	13.37	51	.50	.29	42	8.21	5.44	34	6.18	3.13	49	8.13	8.88

<sup>1</sup>Fats determined in about 54 per cent of samples.

<sup>2</sup>The analyses of the comparatively small quantity of sewage from Saxonville not used in determining the efficiency of these tanks



TABLE No. 4 — Average Results of the Analyses of Monthly Samples of Sewage applied to the Trickling Filters at Brockton, Fitchburg, Maynard, Milford, and Worcester, and their Effluents, etc., Per Cent Removed, etc.  
 [Parts in 100,000]  
 Brockton

	RESIDUE ON EVAPORATION						AMMONIA				Chlorine	NITROGEN AS —		OXYGEN CONSUMED		Kjeldahl Nitrogen	Fats	REMARKS
	TOTAL RESIDUE			LOSS ON IGNITION			Free	ALBUMINOID				Nitrates	Nitrites	Unfiltered	Filtered			
	Total	Dissolved	Suspended	Total	Dissolved	Suspended												
Settled sewage as applied to trickling filter.	39.40	31.70	7.70	18.55	11.68	6.87	3.50	.41	.25	.16	—	—	4.19	2.52	1.07	3.77	Trickling filter has an area of 2.0 acres and a depth of 10 feet of stone from 1.5 to 3 inches in size.	
Effluent from trickling filter.	47.03	40.55	6.48	20.73	15.42	5.31	1.98	.29	.12	.17	1.5584	.0149	3.69	1.69	.71	1.48	One half of filter used alternately. The average rate of operation was about 1,390,000 gallons per acre per day.	
Per cent removed	—	—	16	—	—	23	43	29	52	—	—	—	12	33	34	61		
Settled effluent from trickling filter.	44.52	40.18	4.34	18.47	14.82	3.65	2.14	.22	.14	.08	1.7655	.0268	3.22	1.89	.63	1.29		
Per cent removed by secondary settling tank.	5	1	33	11	4	31	—	24	—	53	—	—	13	—	11	13	Period of sedimentation averaged about 1.89 hours.	
Per cent removed by trickling filter and secondary settling tank.	—	—	44	4	—	47	39	40	44	50	—	—	23	25	41	66	Tanks cleaned 104 times	

TABLE No. 4.—Average Results of the Analyses of Monthly Samples of Sewage applied to the Trickling Filters at Brockton, Fitchburg, Maynard, Milford and Worcester, and their Effluents, etc., Per Cent Removed, etc.—Continued.  
 [Parts in 100,000]  
 Fitchburg

	RESIDUE ON EVAPORATION						AMMONIA				Chlorine	NITROGEN AS —		OXYGEN CONSUMED		Kjeldahl Nitrogen	Fats	REMARKS
	TOTAL RESIDUE			LOSS ON IGNITION			Free	ALBUMINOID				Nitrates	Nitrites	Unfiltered	Filtered			
	Total	Dissolved	Suspended	Total	Dissolved	Suspended												
Imhoff tank effluent as applied to trickling filter.	28.87	26.37	2.50	12.95	11.42	1.53	2.30	.24	.17	.07	—	3.18	2.51	.66	3.20	Trickling filter has an area of 2.14 acres and a depth of 10 feet of stone from 1 to 3 inches in size. The average rate of operation was about 1,514,000 gallons per acre per day for area used (1.86 acres).		
Effluent from trickling filter.	27.90	25.60	2.30	12.34	10.72	1.62	.58	.12	.07	.05	.0230	1.61	1.08	.37	—			
Per cent removed	3	3	8	5	6	—	75	50	59	29	—	49	57	44	—			
Settled effluent from trickling filter as discharged to Nashua River.	27.72	25.40	2.32	12.18	10.59	1.59	.66	.12	.07	.05	.0239	1.60	1.09	.33	—			
Per cent removed by secondary settling tanks.	1	1	—	1	1	2	—	0	0	0	—	1	—	11	—	Period of sedimentation about 7.7 hours.		
Per cent removed by trickling filter and secondary settling tanks.	4	4	7	6	7	—	71	50	59	29	—	50	57	50	—	Tanks cleaned 13 times.		

TABLE NO. 4.—Average Results of the Analyses of Monthly Samples of Sewage applied to the Trickling Filters at Brockton, Fitchburg, Maynard, Milford and Worcester, and their Effluents, etc., Per Cent Removed, etc.—Continued.  
(Parts in 100,000)  
Maynard

	RESIDUE ON EVAPORATION						AMMONIA				Chlorine	NITROGEN AS —		OXYGEN CONSUMED		Kjeldahl Nitrogen	Fats	REMARKS
	TOTAL RESIDUE			LOSS ON IGNITION			Free	ALBUMINOID				Nitrates	Nitrites	Unfiltered	Filtered			
	Total	Dissolved	Suspended	Total	Dissolved	Suspended												
Inhoff tank effluent as applied to trickling filter.	36.11	31.71	4.40	17.66	14.66	3.00	4.93	.45	.30	.15	—	—	4.17	3.24	1.02	—	Trickling filter has an area of .25 of an acre and a depth of 7 feet of stone from 1½ to 2½ inches in size. The average rate of operation was about 249,000 gallons per acre per day.	
Effluent from trickling filter.	53.31	40.20	13.11	24.30	18.33	5.97	2.28	.35	.19	.16	2.1574	.0211	3.47	2.14	79	—		
Per cent removed . Settled effluent from trickling filter as discharged to Asabet River.	45.53	43.82	1.71	21.21	20.42	0.79	54 2.20	22 .18	37 .15	.03	—	.0378	17 2.01	34 1.69	23 .36	—		
Per cent removed by secondary settling tank.	15	—	87	13	—	87	35	49	21	81	—	—	42	21	54	—	Period of sedimentation about 23 hours.	
Per cent removed by trickling filter and secondary settling tank.	—	—	54	—	—	74	55	60	50	80	—	—	52	48	65	—	Tanks cleaned 2 times.	



TABLE NO. 4.—Average Results of the Analyses of Monthly Samples of Sewage applied to the Tricking Filters at Brockton, Fitchburg, Maynard, Milford and Worcester, and their Effluents, etc., Per Cent Removed, etc.—Continued.  
 [Parts in 100,000]  
 Milford

	RESIDUE ON EVAPORATION						AMMONIA				Chlorine	NITROGEN AS —		OXYGEN CONSUMED		Kjeldahl Nitrogen	Fats	REMARKS
	TOTAL RESIDUE			LOSS ON IGNITION			Free	ALBUMINOID				Nitrates	Nitrites	Unfiltered	Filtered			
	Total	Dissolved	Suspended	Total	Dissolved	Suspended												
Imhoff tank effluent as applied to trickling filter.	38.83	31.95	6.88	18.03	12.10	5.93	3.88	.35	.21	.14	.2391	.0104	3.44	2.35	.92	-	Trickling filter has an area of .28 of an acre and a depth of 6 feet of stone from 1 to 1¼ inches in size.	
Effluent from trickling filter.	37.51	31.86	5.65	17.00	12.13	4.87	1.36	.17	.08	.09	1.5201	.0095	1.81	.95	.40	-		
Per cent removed	3	0	18	6	-	18	65	51	62	36	-	-	18	60	57	-		
Settled effluent from trickling filter as discharged to Charles River.	34.90	34.06	.84	13.71	12.05	1.66	1.16	.13	.07	.06	1.7192	.0182	1.48	.92	.31	-		
Per cent removed by secondary settling tank.	7	-	85	19	1	66	15	24	13	33	-	-	18	3	23	-		
Per cent removed by trickling filter and secondary settling tank.	10	-	88	24	0	72	70	63	67	57	-	-	57	61	66	-		

TABLE NO. 4.—Average Results of the Analyses of Monthly Samples of Sewage applied to the Tricking Filters at Brockton, Fitchburg, Maynard, Milford and Worcester, and their Effluents, etc., Per Cent Removed, etc.—Concluded.  
[Parts in 100,000]  
Worcester

	RESIDUE ON EVAPORATION						AMMONIA			Chlorine	NITROGEN AS —		OXYGEN CONSUMED		Kjeldahl Nitrogen	Fats	REMARKS
	TOTAL RESIDUE			LOSS ON IGNITION			Free	ALBUMINOID			Nitrates	Nitrites	Unfiltered	Filtered			
	Total	Dissolved	Suspended	Total	Dissolved	Suspended											
Inhoff tank effluent as applied to trickling filters.	61.08	48.31	13.37	18.55	10.81	7.74	2.59	.29	.13	.16	—	—	5.44	2.82	.84	3.13	Trickling filters have an area of 13.68 acres and a depth of 10 feet of stone from 1¼ to 3 inches in size. The average rate of operation was about 1,391,000 gallons per acre per day.
Effluent from trickling filters.	60.07	49.30	10.77	17.87	12.18	5.69	.52	.21	.06	.15	1.3353	.0214	3.29	1.24	.58	1.47	
Per cent removed	3	—	19	4	—	27	80	28	54	6	—	—	40	56	31	53	
Settled effluent from trickling filters as discharged to Blackstone River.	54.21	48.93	5.28	14.84	11.94	2.90	.55	.14	.06	.08	1.3099	.0224	2.26	1.20	.39	.93	
Per cent removed by secondary settling tanks.	10	1	51	17	2	49	—	33	0	47	—	—	31	3	33	37	Period of sedimentation averaged about 3 hours.
Per cent removed by trickling filters and secondary settling tanks.	12	—	61	20	—	63	79	52	54	50	—	—	58	57	54	70	Tanks cleaned 9 times

TABLE NO. 5.—Average Results of Analyses of Monthly Samples of Effluent from Sand Filters

[Parts in 100,000]

CITY OR TOWN	Free Ammonia	Total Albuminoid Ammonia	Chlorine	NITROGEN AS —		
				Nitrates	Nitrites	Iron
ATTLEBORO <sup>1</sup>	.80	.0795	2.88	1.0245	.0180	.047
BROCKTON <sup>2</sup>	1.05	.0633	7.26	2.1193	.0132	.211
Clinton <sup>2</sup>	1.78	.0548	5.03	.1064	.0026	1.906
Concord <sup>1</sup>	.21	.0377	2.60	1.8537	.0023	.012
Easthampton <sup>1</sup>	1.50	.0945	3.98	.5005	.0120	.062
Framingham (new beds) <sup>3</sup>	1.92	.1100	5.01	1.0002	.0108	.605
Framingham (old beds)	2.42	.1117	5.08	.4184	.0111	1.037
Franklin <sup>1</sup>	1.01	.0789	3.70	.4462	.0166	.263
GARDNER (Gardner Area) <sup>4</sup>	3.56	.1740	7.30	.9785	.0160	.754
GARDNER (Templeton Area) <sup>2</sup>	4.20	.1208	5.39	.2248	.0154	1.470
Hopedale <sup>1, 2</sup>	1.09	.0671	3.30	1.8029	.0015	.019
Hudson	2.94	.2709	4.48	.5084	.0136	.698
Leicester <sup>4</sup>	1.02	.1294	3.64	.2155	.0155	.118
Marion <sup>1</sup>	.31	.0304	4.14	.6550	.0114	.088
MARLBOROUGH <sup>2</sup>	1.31	.0672	4.70	.8122	.0105	.382
Milford	2.27	.0764	5.25	.3276	.0069	.694
Natick	3.16	.1118	5.26	.0934	.0020	.858
North Attleborough <sup>1</sup>	.68	.0327	2.03	.4422	.0082	.388
Northbridge	.36	.0315	2.76	1.3218	.0093	.081
Norwood <sup>2</sup>	1.14	.0560	6.55	.3581	.0259	.325
PITTSFIELD <sup>2</sup>	2.26	.2671	3.13	.0613	.0076	.525
Southbridge <sup>1</sup>	2.80	.0590	4.03	.0421	.0003	1.143
Spencer <sup>1</sup>	1.43	.0433	3.70	.0345	.0010	2.350
Stockbridge <sup>2, 4</sup>	.26	.0403	1.91	.5122	.0094	.169
Westborough <sup>2</sup>	1.13	.0654	4.71	.6572	.0240	.557
Winchendon <sup>1</sup>	.33	.0123	3.18	1.6178	.0026	.026

<sup>1</sup>Six samples.<sup>2</sup>Regular samples from two or more underdrains in one average.<sup>3</sup>Beds constructed in 1924. Sewage passes through Imhoff tanks.<sup>4</sup>Four samples.TABLE NO. 6.—Efficiency of Sand Filters<sup>1</sup> (Per Cent of Free and Albuminoid Ammonia Removed)

[Parts in 100,000]

CITY OR TOWN	FREE AMMONIA			TOTAL ALBUMINOID AMMONIA			CHLORINE		Rate of Operation with Even Distribution (Gallons per Acre per Day) <sup>1</sup>
	Applied Sewage	Effluent	Per Cent Removed	Applied Sewage	Effluent	Per Cent Removed	Applied Sewage	Effluent	
ATTLEBORO	2.62	.80	69	.41	.0795	81	2.77	2.88	75,000
BROCKTON	3.50	1.05	70	.41	.0633	85	4.96	7.26	-
Clinton	2.70	1.78	34	.47	.0548	88	5.34	5.03	51,000
Concord	1.24	.21	83	.19	.0377	80	2.62	2.60	80,000
Easthampton	3.81	1.50	61	.45	.0945	79	3.70	3.98	-
Framingham (new beds) <sup>2</sup>	4.56	1.92	58	.48	.1100	77	6.13	5.01	44,000
Framingham (old beds)	4.66	2.42	48	1.12	.1117	90	5.34	5.08	
Franklin	1.52	1.01	34	.19	.0789	59	2.64	3.70	66,000
GARDNER (Gardner Area)	6.36	3.56	44	1.23	.1740	86	5.24	7.30	-
GARDNER (Templeton Area)	6.06	4.20	31	.54	.1208	78	5.30	5.39	-
Hopedale	4.07	1.09	73	.41	.0671	84	3.50	3.30	46,000
Hudson	4.93	2.94	40	.52	.2709	48	5.28	4.48	71,000
Leicester	3.22	1.02	68	.50	.1294	74	3.58	3.64	-
Marion	1.48	.31	79	.24	.0304	87	3.81	4.14	80,000
MARLBOROUGH	4.50	1.31	71	.62	.0672	89	5.33	4.70	42,000
Milford	3.63	2.27	37	.37	.0764	79	5.41	5.25	40,000
Natick	2.60	3.16	-	.37	.1118	70	3.45	5.26	59,000
North Attleborough	1.70	.68	60	.28	.0327	88	2.28	2.03	78,000
Northbridge	2.60	.36	86	.29	.0315	89	2.35	2.76	67,000
Norwood	2.59	1.14	56	.43	.0560	87	7.52	6.55	-
PITTSFIELD	3.62	2.26	38	.69	.2671	61	3.79	3.13	107,000
Southbridge	3.85	2.80	27	.57	.0590	90	4.48	4.03	70,000
Spencer	4.77	1.43	70	1.97	.0433	98	5.73	3.70	-
Stockbridge	4.06	.26	94	.37	.0403	89	2.04	1.91	-
Westborough	3.66	1.13	69	.66	.0654	90	2.87	4.71	45,000
Winchendon	3.30	.33	90	.28	.0123	96	4.33	3.18	-

<sup>1</sup>See also Table No. 7.<sup>2</sup>Beds constructed in 1924. Sewage passes through Imhoff tanks



TABLE No. 7.—*Extent of Sewerage Works, Rate of Flow, and Rate of Operation of Sand Filters*

CITY OR TOWN	Popula- tion, Census of 1930	Approxi- mate Length of Sanitary Sewers (Miles)	Approxi- mate Number of House Con- nections	ESTIMATED QUANTITY OF SEWAGE TREATED (GALLONS PER DAY)			Estimated Quantity of Sewage per Con- nection	Net Area of Filter Beds (Acres)	Estimated Rate of Operation with Even Dis- tribution (Gallons per Acre per Day)
				Average for Year	Average for Month of Maximum Flow	Average for Month of Minimum Flow			
ATTLEBORO	21,769	37.40	1,795	1,168,000	1,591,000	703,000	651	15.50	75,000
BROCKTON	63,797	105.35	8,606	3,222,000 <sup>1</sup>	6,300,000	1,854,000	374	—	—
Clinton	12,817	24.92	1,914	1,334,000 <sup>2</sup>	2,039,000	953,000	697	26.23	51,000
Concord	7,477	17.46	700	441,000	635,000	334,000	600	8.48	80,000
Easthampton	11,323	23.20	1,253	—	—	—	—	2.20	—
FITCHBURG	40,692	66.28	—	2,815,000	4,253,000	1,871,000	—	—	—
Framingham	22,210	42.00	3,490	1,294,000	1,744,000	961,000	371	29.12	44,000
Franklin	7,028	14.49	837	215,000	335,000	112,000	257	3.24	66,000
GARDNER	19,399	35.60	2,495	—	—	—	—	14.00	—
Hopedale	2,973	7.08	370	175,000 <sup>3</sup>	289,000	108,000	473	3.79	46,000
Hudson	8,469	14.63	1,131	639,000	774,000	426,000	565	9.00	71,000
Marion	4,12	4.12	216	154,000	280,000	83,400	713	1.93	80,000
MARLBOROUGH	15,587	36.78	2,641	847,000	2,935,000	215,000	321	20.19	42,000
Maynard	7,156	7.87	222	62,000	—	—	279	—	—
Milford	14,741	25.41	1,761	369,000 <sup>1</sup>	624,000	269,000	—	9.30	40,000
Nantucket	3,678	—	—	672,000	709,000	588,000	—	4.00	168,000 <sup>3</sup>
Natick	13,589	14.07	1,662	712,000	1,290,000	694,000	428	12.00	59,000
North Attleborough	10,197	17.99	1,041	680,000	880,000	560,000	653	8.75	78,000
Northbridge	9,713	15.93	972	802,000	972,000	638,000	825	12.00	67,000
Norwood	15,049	27.85	2,020	—	—	—	—	14.47	—
PITTSFIELD	49,677	78.15	6,697	4,405,000 <sup>2</sup>	4,890,000	3,726,000	658	41.15	107,000
Southbridge	14,264	—	—	872,000	1,084,000	768,000	—	12.50	70,000
Westborough	6,409	9.11	608	299,000	642,000	187,000	492	6.62	45,000
Winchendon	6,202	11.27	285	—	—	—	—	—	—
WORCESTER	195,311	353.12 <sup>4</sup>	29,243	19,027,000	—	—	651	4.00	—

<sup>1</sup>Includes an average of 2,781,000 gallons per day to trickling filter and 441,000 gallons to sand filters.<sup>2</sup>Entire quantity of sewage not treated.<sup>3</sup>New development not included in average.<sup>4</sup>Records questionable. Amount treated by sand filters only.<sup>5</sup>No underdrains. Filters drained direct to ocean.<sup>6</sup>Includes 70.1 miles of combined sewers.

TABLE No. 8—General Features

City or Town	Year of Construction of Under-drains to Works	Depth of Under-drains (Feet)	Distance Apart of Under-drains (Feet)	Filtering Material	Attention given to Disposal Works
ATTLEBORO	1912, 1913	4-7	35	Excellent sand and gravel; found in place.	One man all the time; others when necessary.
BROCKTON	1893, 1905	5.5	30	Good sand and gravel; found in place.	One chemist in charge, foreman, day and night man; more when necessary.
Clinton	1908, 1899	8	60-70	Good sand and gravel; found in place.	Two men all the time; others when necessary.
Concord	1899, 1928	none	-	Good sand underlain with gravel; found in place.	One man once a day.
Easthampton	1908	3.5	20-40	Good sand and gravel; largely found in place.	One man all the time; others when necessary.
FITCHBURG	1914	-	-	Trickling filter—10 feet deep.	Chemist in charge; 1 foreman, 1 day and 2 night men.
Framingham	1890, 1924	-	-	Good sand and gravel.	One man all the time; others when necessary.
Franklin	1915	4.5	26	Good sand and gravel.	Very little attention; one man once in a while.
GARDNER (Gardner Area)	1891	5	20	Good sand; handled in construction.	One man all the time; others when necessary.
GARDNER (Templeton Area)	1901, 1909, 1931	3-4	20-30	Coarse sand; handled in construction.	One man all the time; others when necessary.
Hopedale	1900, 1923	3	35-60	Good material—sand and gravel.	One man all the time; others when necessary.
Hudson	1904, 1910	5-6	50-100	Good sand and gravel; found in place.	One man all the time; others when necessary.
Leicester	1894, 1928	4	8	Mostly good sand; handled in construction.	Very little attention.
Marion	1906, 1930	5	-	Mostly good sand; pockets of fine sand and some ledge; largely found in place.	One man every day in summer, every other day in winter.
MARLBOROUGH	1891, 1908	4.5-6	30-50	Rather fine sand; found in place.	One man all the time; others when necessary.
Maynard	1909, 1910, 1911	-	-	Trickling filter, 7 feet deep.	One man all the time.
Milford	1929	5	40	Rather fine sand; found in place; trickling filter.	One man every day; others when necessary.
Nantucket	1907, 1924	-	-	Good sand and gravel found in place.	One man when necessary.
Natick	1890	6	36	Sand of good quality, but stratified; found in place.	One man all the time; others when necessary.
North Attleborough	1896	5-6.5	55	Coarse sand and gravel; found in place.	One man every day; others when necessary.
Northbridge	1909, 1910, 1931	4	50-75	Coarse sand and gravel; mostly handled.	Two men all the time; others when necessary.
Norwood	1906, 1907, 1920	4-6	40	Good sand and gravel; partly handled.	One man all the time; others when necessary.
1923, 1924	1909, 1918,	-	-	Good sand and gravel; mostly handled.	One man all the time; others when necessary.
Pittsfield	1901, 1915	4	35	Good sand; mostly found in place.	Two men all the time; others when necessary.
Pittsfield	1901, 1915	4	40	Fair sand and gravel; considerable quantity handled, some found in place.	Two men all the time; others when necessary.
1926	1908, 1925,	-	-	Good sand and gravel; largely found in place.	One man all the time; others when necessary.
Spencer	1897, 1923	1	-	Sand filters, good quality sand.	One man all the time.
Stockbridge	1899, 1921, 1922	{ 3-4.5	23	Irrigation area, rather fine sand.	One man all the time; others when necessary.
Westborough	1892, 1911	{ 3-4.5	30	Good sand and gravel; handled in construction.	One man all the time; others when necessary.
Winchendon	1928	5	30-40	Good sand and gravel found in place.	One man part time.
Worcester	1892 <sup>3</sup> , 1925	-	35-50	Trickling filters, sand area not in use.	Chemist in charge; several men all the time.

<sup>1</sup>Only three beds underdrained.

<sup>2</sup>Year of first construction of sand filters

Many additions

<sup>3</sup>Sedimentation tanks and sand beds abandoned June, 1925.

and secondary tanks installed.

Imhoff tanks, trickling filters

## EXAMINATION OF SEWER OUTLETS DISCHARGING INTO THE SEA

Special examinations were made during the year in the vicinity of the outlet of the South Essex Sewerage District in Salem Harbor and of the Manchester sewer outlet, and the results of these examinations were under consideration at the end of the year.

## INVESTIGATIONS RELATIVE TO SHELLFISH

Various examinations have been made during the year of the coastal areas, and restrictions were removed during the latter part of the year on Revere Beach. Restrictions also were removed from a part of Hingham Harbor, Long Beach in Swansea, a part of the Apponaganset River in Dartmouth, a portion of the Annisquam River in Gloucester Harbor and Nantucket Harbor during the part of the year when these areas were not subject to pollution from the summer population.

A large amount of shellfish was taken from the contaminated waters about New Bedford and transplanted at Fairhaven during the warmer part of the year, and this valuable product has since been taken for food purposes after analyses made by the Department showed that the shellfish were safe for use as food. This transplanting process was under the supervision of the Supervisor of Marine Fisheries of the Department of Conservation.

The shellfish chlorinating plant of the Pioneer Fisheries Company at Plymouth temporarily discontinued its operation during the year. A new plant was established by the Scituate Certified Clam Company in Scituate during the year but was not in operation at the end of the year. The Newburyport Shellfish Treatment Plant has been continued in operation throughout the year. These plants have been operated under the supervision of the Department, and daily analyses indicate satisfactory results.

The issuing of shippers' certificates was transferred to this division during the latter part of the year.



## REPORT OF THE DIVISION OF TUBERCULOSIS

ALTON S. POPE, M.D., *Director*  
LOUIS N. PHANEUF, *Assistant Director*  
PAUL WAKEFIELD, M.D., *Chief of Clinics*

I have the honor to submit the twelfth annual report of the Division of Tuberculosis. This report consists of an outline of the major activities of the Division for the fiscal year ending November 30, 1931, together with certain developments in policy, both in the Department and the State at large.

In spite of two years of profound economic depression, we are able to record a steadily continued decline in cases and deaths from tuberculosis. With 4,421 cases and 2,306 deaths from pulmonary tuberculosis, a new low mortality rate of 53.9 per 100,000 is established for the State. Gratifying as this gain is it should not blind our eyes to the fact that the mortality from tuberculosis in Massachusetts is still over five times that from all other communicable diseases in the State. Furthermore, a continuation of the present hard times may yet result in a serious flare-up of tuberculosis morbidity and mortality.

In continuation of our policy of decentralization of service, three positions of tuberculosis field nurse were abolished at the end of the fiscal year. The routine work of these nurses will so far as possible be taken over by local tuberculosis nurses, and their advisory duties assumed by the consultant nurses in the Division of Child Hygiene who have taken on a generalized nursing program. The remaining tuberculosis field nurse in the Division will act as a consultant in tuberculosis to the local and general consultant nurses. Intelligent, well-directed public health nursing is indispensable to effective local service to the tuberculous. In our opinion the establishment of such service depends upon community interest and support. The State Department should, upon request, assist freely in the organization and development of local tuberculosis nursing, but the responsibility for the service belongs wholly to the community.

Any report on tuberculosis nursing would be incomplete without mention of the splendid Institutes of Public Health Nursing sponsored jointly by the Massachusetts Tuberculosis League and the Department of Public Health. In March, three-day meetings were held at Northampton, Worcester, Boston and New Bedford. A total of 400 public health nurses registered for the lectures. Mrs. Violet H. Hodgson, of the National Organization for Public Health Nursing, was the principal speaker on tuberculosis, and her masterly presentation of the principles and technique of tuberculosis nursing was an inspiration to all who heard her.

## STATE SANATORIA

During the year the four State Sanatoria, Rutland, Westfield, North Reading and Lakeville, have furnished 428,973 days' treatment for 2,105 patients. Of these cases 1,133 were in the institutions at the beginning of the year and 972 represent new admissions. By type these cases were divided as follows: Rutland, 651 cases of adult pulmonary tuberculosis; North Reading and Westfield, 1,008 children with adult or childhood type of the disease; Lakeville, 446 patients with extra-pulmonary forms of tuberculosis. Eighty-two more patients were treated than during the preceding year, and 26,024 more days' treatment were provided.

The per capita costs at the State Sanatoria in 1931 were essentially the same as for the past few years. At Rutland the average cost was \$17.29; at North Reading \$17.80, at Westfield \$17.58, and at Lakeville \$19.62 per week.

Upon the completion of one building, now under construction, the Five-Year Building Program outlined in 1927 will be practically finished. This program involved substantial increases in the bed capacity at North Reading and Lakeville, including a modern type of admission and isolation building for children at each institution. Houses for the superintendents at Westfield and Lakeville have made possible a much more effective utilization of the administration buildings at these hospitals for out-patients and other purposes. Employees' dormitories at Rutland, North Reading and Lakeville are making it easier to obtain and hold the type of personnel essential to an effective sanatorium.

On June 26 the new Medical and Surgical Building was dedicated at Rutland.

This provides an operating room, pneumothorax room, X-ray and fluoroscopy rooms, dark room, staff conference room, dental clinic and out-patient clinic. Five beds for convalescent cases are included in the adjacent wing of the main building. This building fills an urgent need in the extensive development of thoracic surgery at Rutland as well as caring for all the incidental surgical work which arises in a hospital of 360 beds. A modern cow barn for 50 cows and 20 head of young stock was completed in November. This houses the excellent, accredited herd of the institution; and an attached dairy provides for pasteurization of the milk and sterilization of utensils on the premises.

At North Reading a dormitory for 40 employees was completed in September. This building and an addition of 12 rooms to the nurses' home take care of the increase in personnel incidental to the recent growth of the sanatorium and make it possible to house practically the entire staff on the grounds.

On November 1st an affiliating course in Pediatrics was opened for pupil nurses of the Rutland State Sanatorium Training School. The students receive 25 lectures from the Medical Staff in addition to the general instruction and quizzes conducted by the Superintendent of Nurses.

The Superintendent's house at Westfield was finished in May and the Superintendent's old quarters in the Administration Building have been remodelled for an out-patient department. These new quarters and the installation of up-to-date X-ray apparatus add greatly to the effectiveness of the extensive out-patient work of the institution. In October ground was broken for an employees' dormitory which will be ready for occupancy next spring. This building will accommodate 40 employees and overcome the serious shortage of employees' quarters on the hospital grounds.

At Lakeville the Governor's emergency appropriation made possible the construction of urgently needed additions of single rooms on the men's and women's wards. This was especially opportune as it relieved the long waiting list for women at the institution. The same appropriation provided for an occupational therapy shop which is proving very useful in the handling of patients taking the prolonged treatment necessary for bone and joint tuberculosis. Here also the completion of the superintendent's house has made it possible to utilize more effectively the ground floor of the Administration Building for staff quarters and clerical offices, and at the same time to give the superintendent and his family some relief from constant contact with the hospital. The addition of 72 beds in 1930 and 18 more beds in 1931 has necessitated the employment of a fifth assistant resident physician. The visits of our orthopedic consultant have been increased from four to six per month on account of the marked increase of operative work during the year.

In September the four State Tuberculosis Sanatoria were inspected by the American College of Surgeons and all have been officially approved.

#### PONDVILLE CANCER HOSPITAL

The steady growth of the demand for cancer service at Pondville has continued during the past year, and has demonstrated beyond question the need of such a public institution. The objection has been raised that Pondville might be used as a dumping ground for inoperable cases of cancer from the general hospitals of the State. That such is not the case is clearly shown by a study recently completed by Dr. Lombard of the Division of Adult Hygiene. This investigation shows that during the past year 96 general hospitals in Massachusetts treated 46 per cent more cases of cancer than these same hospitals treated five years ago. This would suggest that the cancer work at Pondville and in the State-aided cancer clinics may have stimulated interest in the diagnosis and treatment of cancer in general hospitals.

Increased activity has marked both house and out-patient services. During the year 1,017 patients have been treated in the hospital. Of these 110 were in the house at the beginning of the year, and 907 more were admitted, of which 188 represent readmissions. This is an increase of 134 over the number of patients treated during the previous year.

The average duration of treatment was 44 days, 2 days less than the average for the preceding year. The average number of patients per day was 113.5, with



a possible maximum capacity of only 115. The per capita cost during 1931 was \$38.23 per week.

The average attendance at the regular Thursday clinic has increased from 27 to 35 and the increased demands for service have made it necessary to provide special clinics which cared for 1,050 patients during the year.

These increased demands, especially in the out-patient department, have made necessary additions to the staff of another visiting surgeon, an assistant gynecologist and an assistant internist. The establishment of a pathological laboratory with a full-time resident pathologist has been of great assistance in the work of the hospital.

With the results of another year's work before us, it is more obvious than ever that steps should be taken at once to keep pace with the urgent demands for increased public health service in cancer. The capacity of Pondville is now taxed to its limit. The addition of further beds is not possible until provision is also made for additional service and employees' quarters. Plans for a hospital wing of 50 beds and a service building and surgery have been included in the 1932 budget of the Department.

#### COUNTY SANATORIA

The new Middlesex County Sanatorium at Waltham opened for patients on September 30, 1931. This fine institution accommodates 225 patients and represents the latest developments in the hospitalization of the tuberculous. An adequate out-patient department will be opened the first of the year and the hospital promises to become a real center for the diagnosis and treatment of tuberculosis in Middlesex County.

Since the opening of the new Middlesex County Hospital the anomalous situation has arisen of waiting lists for three or four of the county hospitals while there were a few empty beds at Rutland. Towns have been unwilling to utilize such beds at the State Sanatorium at \$17.50 per week when the rates at their county hospitals are from \$9.10 to \$12.25 per week. To relieve this situation and to make beds at Rutland available to suitable patients from all parts of the State, the Department has secured the introduction of a bill amending Section 66 of Chapter 111 of the General Laws, to allow the Department to fix a rate of \$10.50 per patient per week at Rutland instead of the actual cost as now provided. This proposed rate is the amount now recoverable by towns from the State Department of Public Welfare for the hospitalization of unsettled cases and would, we believe, result in the more complete use of all tuberculosis beds in the Commonwealth.

The Worcester County Sanatorium in West Boylston is now nearing completion and will probably be ready to admit patients late in the year 1932. The opening of these new hospitals in Middlesex and Worcester Counties will raise the total hospital beds for tuberculosis in the State to 4,100, approximately 1.7 beds to each annual death from tuberculosis. The withdrawal of Middlesex County patients from Rutland has relieved the appalling waiting list at Rutland, and the removal of Worcester County patients also should make it possible to use the facilities of Rutland much more effectively for the treatment of early and favorable cases from all parts of the State.

The construction of a Medical and Surgical Building at the Bristol County Sanatorium together with the installation of an up-to-date X-ray apparatus marks commendable progress in the treatment of tuberculosis at that institution.

During the current year the counties of Dukes and Nantucket have with the approval of this Department renewed their contracts for the care of their tuberculosis patients at the Barnstable County Sanatorium.

#### SOCIAL SERVICE

Social service in tuberculosis has continued this year in its efforts to meet the varied social problems of the patients in the four State Sanatoria. The chief developments of the service have been along two main lines.

1. Investigation, while the patient is still in the Sanatorium, of the social and economic conditions in the home to which he will return, so that the gains secured by treatment may not be lost by return to unsuitable living conditions.

2. Cooperation with the superintendents in the solution of family problems and emergencies which too often prevent successful completion of Sanatorium treatment.



At our children's sanatoria a social appraisal of the home has been made in practically every instance before the discharge of the patient. In this way it has often been possible to arrange for more adequate care for the child on his return, and to interpret to the parents the importance of continued medical supervision.

From the beginning of this year the social workers have attended staff conferences at each of the State Sanatoria at intervals of five or six weeks. These visits have led to a better understanding of the institution problems by the workers and a more effective use of the service by members of the medical staff. In many instances the social worker has been able to make some family adjustment or reassure a worried patient so that he has continued his treatment.

During the year, 709 home visits have been made; medical and social agencies have been contacted 1,601 times. The service has covered 139 cities and towns. Recently at the request of a nursing group, a consultation service has been established in the Nashoba District.

From our experience it seems obvious that social work is an integral part of the well-rounded field service which is essential to a sound tuberculosis control program. It is hoped that an additional worker can be secured this year to meet the pressing demands for extension of this service.

#### THE TEN-YEAR PROGRAM

Following is the summary of the seventh year's work of the Chadwick Clinics:

Total school population of towns visited	99,472
Number given Von Pirquet test	57,412
Number of reactors	16,426
Number X-rayed	16,612
Number examined	3,476
Number contacts examined	450
Number diagnosed as pulmonary tuberculosis	31
Number diagnosed as pulmonary tuberculosis suspect	21
Number diagnosed as hilum tuberculosis	409
Number classified suspects	1,654
Number cases of malnutrition	156

During the school year 1930-1931 over 57,000 children were examined in the Chadwick Clinic. Of these 8,731 were in high schools, a marked increase in the number of high school students examined. Better understanding of the objects of the clinic have also led to an increase in the number of consents for examinations which this year reached a new mark of 60 per cent in the grade schools. The practice of the Director of the Clinics discussing with the family physician each case of pulmonary tuberculosis found has been of great value in securing the co-operation of practicing physicians and in hastening admission to sanatoria when indicated.

In the autumn of 1930, the Clinic worked chiefly in Berkshire and Franklin Counties, visiting a number of small towns not previously examined. After Christmas, work was begun in Lowell, Lawrence and the surrounding towns. The spring term was spent chiefly in small communities in the eastern part of the State and in some of the towns near Springfield. This fall the clinic has been working largely on Cape Cod.

Through the cooperation of the State Department of Education arrangements have been made for the examination of the students in the ten State Normal Schools this winter. This work with students who in the next few years will become the teachers in our public schools is, we believe, a most valuable opportunity to lay a permanent foundation for intelligent tuberculosis work among school children.

Cities and towns visited in 1930-31: Adams, Alford, Andover, Ashfield, Becket, Billerica, Blandford, Brimfield, Buckland, Carlisle, Chelmsford, Cheshire, Clarksburg, Colrain, Dalton, Egremont, Florida, Great Barrington, Hancock, Hinsdale, Holland, Lanesborough, Lawrence, Lee, Lenox, Lowell, Methuen, Middlefield, Monroe, Monterey, Montague, Montgomery, Mt. Washington, New Ashford, Newburyport, New Marlborough, North Adams, North Andover, Otis, Pittsfield, Richmond, Russell, Sandisfield, Savoy, Sheffield, Shelburne, Stockbridge, Tewksbury, Tyngsborough, Tyringham, Wales, Washington, Westford, West Stockbridge, Williamstown and Windsor.

## SUMMARY OF SEVEN YEARS' WORK

	Date	Number of Children examined	Number of Contacts examined	Number given Tuberculin Test	Number of Reactors	Per Cent of Reactors	Number of Children X-Rayed	Number of Cases of Pulmonary Tuberculosis	Per Cent of Pulmonary Cases given Test	Number of Cases of Hilum Tuberculosis	Per Cent of Hilum Cases of the Number given Test	Number of Cases classified as Suspects
First year	1924-1925	10,648	1,612	10,016	2,927	29	3,008	31	.31	561	5.6	1,114
Second year	1925-1926	19,073	2,955	18,601	5,314	29	6,121 <sup>1</sup>	19	.1	621	3.3	1,399
Third year	1926-1927	19,527	2,367	19,194	5,188	27	6,381	29	.1	524	2.7	1,112
Fourth year <sup>2</sup>	1927-1928	26,177	913	26,052	7,219	28	7,909 <sup>1</sup>	8	.03	376	1.4	896
Fifth year	1928-1929	25,093	930	25,699	7,423	29	9,446 <sup>1</sup>	11	.04	415	1.6	848
Totals for first five years		101,118	8,777	99,562	28,071	28	32,822 <sup>1</sup>	98	.10	2,497	2.5	5,369
Sixth year <sup>3</sup>	1929-1930	2,459	309	49,379	11,298	23	11,277	26	.05	439	.9	1,065
Seventh year <sup>4</sup>	1930-1931	3,476	450	57,412	16,426	29	16,612	31	.05	409	.7	1,654
Totals for seven years		107,053	9,536	206,353	55,795	27	60,711	155	.07	3,345	1.6	8,088

<sup>1</sup>This figure includes X-rays of Re-examinations, Summer Camp Children, Adults, and Special Requests.<sup>2</sup>The first three years an attempt was made to examine the contact cases and the children who were 10 per cent or more underweight.<sup>3</sup>These figures include the examination of 7,318 high school students.<sup>4</sup>These figures include the examination of 8,731 high school students.

The Follow-Up Clinic has continued the annual reexamination throughout the State of all cases of tuberculosis or suspected tuberculosis in children previously found by the Chadwick Clinic. During the year 3,845 children were examined and 80 children were recommended for sanatorium care.

The Director of the Follow-up Clinic read a paper on "What We Have Learned from the Ten-Year Program in Massachusetts"<sup>1</sup> at the New England Health Institute at Portland, Maine, in April. In June he also presented a paper before the Tuberculosis Section of the Massachusetts Medical Society at Boston, on "Pulmonary Tuberculosis in Adolescence."<sup>2</sup>

In May the Director of the Division gave a progress report on the Ten-Year Program in Massachusetts at the annual meeting of the American Medical Association in Philadelphia, under the title "The Discovery and Prevention of Tuberculosis in the Community."<sup>3</sup>

#### SUBSIDY

In 1930 subsidy claims totalling \$278,654.20 were paid to towns in the Commonwealth for the hospitalization of tuberculosis patients in hospitals approved by the Department of Public Health. During the past year a total of \$343,320.37 in subsidy claims was allowed. This large increase is due chiefly to the emergency hospitalization of Middlesex and Worcester County cases in private sanatoria approved by the State. The opening of the new Middlesex and Worcester County Sanatoria will mean the payment of at least as large subsidy totals for some years.

If the subsidy is to serve its purpose of securing more adequate care of the tuberculous in Massachusetts some provision must be made to bring patients to our Sanatoria in an earlier, more favorable stage of the disease. For this purpose the Department is recommending to the Legislature that the subsidy be allowed only to towns that in addition to hospitalizing their patients in a hospital approved by the State maintain a local diagnostic and follow-up service to the tuberculous which complies with reasonable minimum standards to be prepared by the Department of Public Health. Last year the Legislature authorized county sanatoria to maintain out-patient departments and to furnish on request to towns or groups of towns in their respective districts, diagnosticians for tuberculosis clinics. It is believed that the above facilities, together with those already available at the state sanatoria, will make it possible for even the smaller towns to organize a type of case finding that will bring a majority of tuberculosis patients under treatment in a favorable instead of an unfavorable stage of the disease, and at the same time, by early discovery, to limit substantially the spread of the infection in the community.

<sup>1</sup>Zack's David, N. E. Journal of Medicine, Vol. 204, No. 20, pp. 1037-1039, May 14, 1931.

<sup>2</sup>Zacks, David, N. E. Journal of Medicine, Vol. 205, No. 11, pp. 525-533, Sept. 10, 1931.

<sup>3</sup>Pope, Alton S., Journal American Medical Association, Vol. 97, pp. 846-849, Sept. 19, 1931.

### LAKEVILLE STATE SANATORIUM

#### RESIDENT OFFICERS

LEON A. ALLEY, M.D., *Superintendent*.  
 GEORGE L. PARKER, M.D., *Assistant Superintendent*.  
 ARTHUR KANSERSTEIN, M.D., *Assistant Physician*.  
 RICHARD C. COOKE, M.D., *Assistant Physician*.  
 LOUIS ALPERT, M.D., *Assistant Physician*.  
 RICHARD METCALF, M.D., *Assistant Physician*.  
 EMANUEL KLINE, D.M.D., *Dentist*.  
 CHIN S. CHANG, M.D., *Junior Bacteriologist*.  
 CAROLINE T. WHITE, R.N., *Superintendent of Nurses*.  
 MARY C. O'CONNELL, *Head Teacher*.  
 KATHARINE NUTE, *Head Occupational Therapist*.  
 SUSAN M. MURPHY, *Head Housekeeper*.  
 CHESTER TAYLOR, *Steward*.  
 ROBERT A. KENNEDY, *Chief Power Plant Engineer*.  
 THOMAS FRANCIS MAHONY, *Head Farmer*.



## NON-RESIDENT OFFICERS

FLORENCE S. MONROE, *Principal Bookkeeper and Treasurer.*

ZABDIEL B. ADAMS, M.D., *Orthopedic Consultant.*

LOUIS A. O. GODDU, M.D., *Orthopedic Consultant.*

## Report of the Superintendent

TO GEORGE H. BIGELOW, M.D., *Commissioner, Department of Public Health:*

I have the honor to submit the twenty-second annual report of the Lakeville State Sanatorium for the year ending November 30, 1931.

During the year there has been expended \$283,137.24 for maintenance, a gross weekly per capita cost of \$19.6188. There has been collected from miscellaneous sources (the total of all collections) \$116,352.09. Deducting this amount from the gross maintenance expense leaves a net expense of \$166,785.15 and a net weekly per capita cost of \$11.5567. There has been collected from private sources \$6,015.19 from cities and towns \$108,784.00, from the State Board of Retirement \$28.27, and from sales \$1,524.98.

There were 25 patients supported wholly or in part by private funds, 283 by cities and towns, 68 wholly by the State, 4 state wards, and 66 patients on whom settlement has not been determined.

As authorized by Chapter 115, Acts of 1930 (\$6,800.00 for New Water Supply), expended prior to 1931, \$6,005.91. This work has been completed. As authorized by Chapter 146, Acts of 1929 and Chapter 115, Acts of 1930 (\$17,700.00 Fire Protection), expended prior to 1931, \$12,901.24, during 1931, \$4,299.78, total, \$17,201.02. Not completed. As authorized by Chapter 146, Acts of 1929 (\$132,500.00 for Children's Building), expended prior to 1931, \$132,335.12, during 1931, \$131.83, total, \$132,466.95. Reverting to State Treasury, \$33.05. As authorized by Chapter 115, Acts of 1930 (\$21,000.00 for Superintendent's House), expended prior to 1931, \$6,125.26, during 1931, \$14,752.42, total, \$20,877.68. This work has been completed. As authorized by Chapter 115, Acts of 1930 (\$10,000.00 for Furnishings and Equipment on Children's Building), expended prior to 1931, \$9,689.44, during 1931, \$230.53, total \$9,919.97. This work has been completed. As authorized by Chapter 115, Acts of 1930 (\$13,000.00 for Alterations on Administration Building), expended prior to 1931, \$8,296.44, during 1931 \$3,457.28, total, \$11,753.72. Not completed. As authorized by Chapter 1, Acts of 1931, (\$17,000.00 for Alterations of Two Buildings), expended during 1931, \$14,721.81. Not completed. As authorized by Chapter 1, Acts of 1931 (\$5,700.00 for Repairs and Improvements), expended during 1931, \$4,921.73. Not completed.

There were 249 patients in the Sanatorium at the beginning of the year, December 1, 1930, and 287 patients at the close, November 30, 1931. The largest number present at one time was 297, and the smallest 249. The daily average number of patients was 277.5, which was 44.3 more than last year. Daily average number of bed patients was 239.9, children 153.2, adults 86.7. There were 197 patients admitted during the year. For the classification of patients admitted, your attention is called to "Table No. 7." The average age of patients admitted was 23 years. Including deaths, there were 195 patients discharged, and the average duration of residence was 416 days. Of those discharged 104 patients gained 1,604.50 pounds, an average gain of 15.4 pounds per person. Of those discharged there were 52 arrested, 1 apparently arrested, 16 quiescent, 42 improved, 4 unimproved, 19 deaths, 10 not considered (duration of treatment being less than one month), 15 non-tuberculous. There were 101,301 hospital days of treatment, 16,187 more than last year.

## APPOINTMENTS AND RESIGNATIONS

Dr. Louis Alpert, graduate of Harvard College 1925 and Boston University Medical School 1929, was appointed a member of the resident medical staff as Assistant Physician on December 17, 1930. Dr. Peter Ferrini, Senior Assistant Physician, resigned September 10, 1931, to take up the practice of medicine in Brockton. Dr. Richard Metcalf, a graduate of Tufts Medical School 1913, was appointed Assistant Physician on the resident staff September 27, 1931. Dr. Emanuel Kline, dentist, beginning January 5, 1931, has devoted full time to his

duties at this Institution. Up to that time he spent three and one half days at Lakeville and two days at Pondville each week. The increase in the number of patients, especially children, necessitated this change to a full-time basis at Lakeville.

#### MEDICAL REPORT

The past year has been one of the most active for the medical staff of any year since the type of patient was changed from the pulmonary to the extra-pulmonary group. Each week staff conferences have required several hours to properly discuss new admissions, methods of treatment, cases for discharge and general policies of an administrative as well as of a medical nature. One evening each month the staff has met for the discussion of interesting cases and a review of the current medical literature. The steward has been present at several of these conferences at which time feeding problems, especially as applied to children, have been broadly discussed.

The following medical meetings have been held at the Institution during the past year: A meeting of approximately fifty medical students for an entire day in order that they might familiarize themselves with the modern methods of treatment of extra-pulmonary tuberculosis. The Plymouth District of the Massachusetts Medical Society held its spring meeting on April 16, 1931, in the hall at the Sanatorium, following which they visited the various wards and witnessed the demonstration of various types of cases. In May, the South Eastern District of the Massachusetts Organization for Public Health Nursing held its meeting and visited the wards to witness the various cases in connection with the treatment. At each one of the above meetings various members of the medical staff presented subjects of interest and made up practically the entire program of speakers. I feel that these meetings are of enormous value to the Institution and the public at large as it is through the contact with these organizations of various kinds that the methods of admission of patients, treatments and follow-up systems can be freely discussed, which is bound to result in closer cooperation by the various active health agents and the Sanatorium.

The efficiency of the laboratory has been definitely increased by a very satisfactory affiliation with the laboratory at the Cancer Hospital in Pondville, which has resulted in our bacteriologist making regular visits to that hospital and the pathologist from Pondville making regular visits to Lakeville. More postmortem examinations as well as an increase in the amount of tissue work has already resulted from this affiliation.

The value of the contagious unit has again been well demonstrated by the fact that the following contagious diseases have been treated at the Institution during the past year: Chicken pox 16, Erysipelas and erysipeloid lesions 11, Diphtheria 2, Mumps 1.

The tables and figures in this report show there has been a marked increase in practically all of the activities pertaining to the treatment of the patients over those of any previous year. While this may be accounted for somewhat by the increased number of patients, nevertheless in many instances the increase is due to some changes in the trend of the general and specialized phases of treatment. The facilities offered to the patients are much broader in scope than has previously been possible.

The visits of our orthopedic consultant have been increased from four visits to six visits each month. This increase of time on the part of our consultant was made necessary by the large number of patients coming up for operation, there being an increase of twenty-five operations above the number performed in 1930.

The general policies of rest, both general and local and the use of heliotherapy, both natural and artificial, have been continued throughout the year with but slight if any modification over those practices that have already been proven to expedite the patient's recovery. The number of cases receiving local rest by means of plaster casts shows an increase of twenty-two more than for the previous year, the total number for 1931 being 621. A total of 1,872 X-rays were taken which was an increase of 661 more than last year. The photographic work was increased by 101, there being a total of 316 photographs taken.

A paper entitled "A Study of Twenty Cases of Sacro-iliac Tuberculosis at the Lakeville State Sanatorium" was written by Dr. George L. Parker, Assistant

Superintendent and published in the September 17, 1931, issue of the New England Journal of Medicine.

A survey of the Institution was made by a representative of the American College of Surgeons following which the Sanatorium was fully approved by the College.

Routine nose and throat cultures on all new admissions have proven of value as shown by the fact that several diphtheria carriers were discovered in this way, which resulted in their isolation before any spread of the infection could take place. The general immunization policy as applied to patients and employees has been continued and we feel should be increased rather than decreased in any way.

The Out-Patient Department has continued to furnish services to the community at large and the diagnosis of tuberculosis was made in many instances.

The opportunity for follow-up work on discharged patients has been increased. The joint conferences of the members of the Social Service Department with our medical staff have been of great value in considering the general welfare of the patient before and especially after discharge.

### *Operations, Casts and Consultation Examinations*

#### *Operations*

The following operations were performed during the year:

Amputation: Hand . . . . .	1	Tonsillectomies and Adenoidectomies	36
Appendectomy . . . . .	2	Circumcisions . . . . .	3
Arthrodesis:		Biopsy, left hip . . . . .	1
Elbow . . . . .	2	D and C . . . . .	1
Foot . . . . .	2	Excision old skin scar . . . . .	1
Hip . . . . .	12	Excision papilloma . . . . .	1
Knee . . . . .	4	Incision and drainage:	
Sacro-iliac . . . . .	3	Arm . . . . .	1
Spine . . . . .	10	Hand . . . . .	1
Colostomy . . . . .	1	Removal of foreign bodies:	
Excision head and shaft right		Splinters . . . . .	4
fibula . . . . .	1	Needle . . . . .	1
Excision of tumor . . . . .	1		—
Laminectomy . . . . .	2	Total operations . . . . .	104
Laparotomy, exploratory and biopsy	1		
Ostectomy . . . . .	5		
Plastic bone graft, jaw . . . . .	1		
Removal semiluna cartilage . . . . .	1		
Sequestrectomy . . . . .	5		

#### *Casts*

Plaster casts for the year were as follows (types classified):

A and P shells . . . . .	14	Jackets . . . . .	115
Boots . . . . .	35	Jackets with collar . . . . .	20
Boots with cylinder . . . . .	22	Jackets with helmet . . . . .	60
Buckets . . . . .	8	Jackets with long spica . . . . .	20
Cylinders . . . . .	23	Jackets with short spica . . . . .	100
Cylinders to arms . . . . .	20	Jackets with shoulder straps . . . . .	50
Cylinder to forearm and hand . . . . .	1		—
Spica, long short . . . . .	90	Total casts . . . . .	621
Spica, short single . . . . .	43		

#### *Consultation Examinations*

	Positive	Suspicious	Negative	Re-exam.	Totals
Out-patients . . . . .	22	3	22	7	54
Employees . . . . .	—	—	30	—	30
	22	3	52	7	84



## LABORATORY, X-RAY AND PHOTOGRAPHIC REPORT

<i>Clinical Microscopy</i>		Number
Blood	Hemoglobin determination . . . . .	361
	Red blood cell counts . . . . .	361
	White blood cell counts . . . . .	277
	Differential counts . . . . .	278
	Blood platelete . . . . .	2
	Blood culture . . . . .	3
	Bleeding time . . . . .	39
	Coagulation time . . . . .	39
	Blood grouping . . . . .	48
	Blood sugar . . . . .	6
	Non-protein nitrogen . . . . .	9
	Uric acid . . . . .	1
	Blood calcium . . . . .	1
Sputum:	{ Positive T. B. . . . .	18
	{ Negative T. B. . . . .	429
Urine analysis . . . . .		3,980
Spinal fluid:	{ Positive T. B. . . . .	9
	{ Negative T. B. . . . .	12
Feces . . . . .		54
Pleural fluid . . . . .		9

*Bacteriological and Serological Tests*

Throat cultures	{ Clinical diphtheria . . . . .	2
	{ Diphtheria carriers . . . . .	19
	{ Negative Klebs-loeffer bacilli . . . . .	213
Purulent discharges examined for tubercle bacilli . . . . .		1,833
Bacteriological cultures . . . . .		633
Milk — plate counts and fat . . . . .		1
Occult blood test . . . . .		27
Guaiac tests . . . . .		25
Isolation and cultivation of tubercle bacilli . . . . .		751
Phenolsulphonphthalein tests . . . . .		49
Gastric contents . . . . .		3
Von Pirquet and Mantoux tests:		
	{ Positive . . . . .	198
	{ Negative . . . . .	41
Typhoid agglutination tests . . . . .		59
Purdy tests . . . . .		250
Wassermann tests	{ Positive . . . . .	13
	{ Doubtful . . . . .	8
	{ Negative . . . . .	215
Kahn tests	{ Positive . . . . .	4
	{ Negative . . . . .	2
Hinton tests	{ Positive . . . . .	2
	{ Negative . . . . .	1

*Animal Experimentation*

Inoculations	{ Guinea pig . . . . .	73
	{ Rabbit . . . . .	2
Autopsies	{ Guinea pig	
	{ Positive T. B. . . . .	31
	{ Negative T. B. . . . .	46
	{ Rabbit	
	{ Positive T. B. . . . .	2

10,439

*Pathology*

Pathological examinations . . . . .		103
Postmortem examinations . . . . .		4
Tissue secting (celloidin sections and freezing sections) . . . . .		240

*Preparation of Media (each month)*

Glycerine bouillon . . . . .		13
Glycerine agar potato . . . . .		5

Glycerine egg medium . . . . .	8
Petroff's medium . . . . .	5
Blood agar plate . . . . .	1
Loeffler's medium . . . . .	5
Hormone media . . . . .	1
Total . . . . .	10,824
<i>Proven Tuberculosis</i>	
Diagnosis (by guinea pig)	
Tuberculous chest sinus . . . . .	1
Tuberculous foot . . . . .	1
Tuberculous glands . . . . .	4
Tuberculous groin . . . . .	1
Tuberculous hip . . . . .	8
Tuberculous intestine . . . . .	1
Tuberculous knee . . . . .	1
Tuberculous kidney . . . . .	2
Tuberculous peritonitis . . . . .	6
Tuberculous sacro-iliac . . . . .	2
Tuberculous spine . . . . .	6
Pulmonary tuberculosis . . . . .	1
Pathological Diagnosis	
Histological tuberculosis . . . . .	15
Acute appendicitis . . . . .	1
Syphilis . . . . .	1
Total . . . . .	51

*X-rays*

Number of X-rays taken from December 1, 1930, to November 30, 1931 1,872

*Photographs*

Number of photographs taken from December 1, 1930, to November 30, 1931 316

## DENTAL REPORT

*From December 1, 1930, to November 30, 1931*

Examinations . . . . .	332	Radiographs . . . . .	143
Prophylaxis treatments . . . . .	269	Irrigations . . . . .	189
Fillings:		Vincent's infection treatments . . . . .	20
Permanent teeth . . . . .	488	Root canal treatments . . . . .	12
Temporary teeth . . . . .	64	Pulpectomies . . . . .	2
Extractions:		General anesthesia . . . . .	16
Permanent teeth . . . . .	227	Removal of impacted teeth . . . . .	1
Temporary teeth . . . . .	164	Orthodontic treatments . . . . .	3
Treatments . . . . .	647	Novocaine injections . . . . .	151
Restorations:		Oral surgical operations . . . . .	8
Dentures:		Total operations . . . . .	2,749
Full . . . . .	7		
Partial . . . . .	2		
Bridges . . . . .	2		
Bridge repair . . . . .	1		
Vulcanite splint . . . . .	1		
Visits . . . . .			1,265
New patients . . . . .			248
Dismissals . . . . .			208

A policy similar to the one of the previous year was again carried out. An effort was made to complete the mouths of all patients prior to operation and all patients prior to discharge.

The increase in the number of Vincent's infection treatments over last year was due not to any new cases cropping up in the hospital, but to the admission of two new patients who had the infection on admission.

A survey of the discharged patients to determine the average amount of work each received according to the length of hospitalization follows:

LENGTH OF HOSPITALIZATION	Number of Patients	Number of Visits	Number of Operations	Average Number Visits per Patient	Average Number Operations per Patient
1 month or less . . . . .	19	20	32	1.05	1.68
1 to 3 months . . . . .	8	25	38	3.12	4.75
3 to 6 months . . . . .	25	88	130	3.52	5.20
6 months to 1 year . . . . .	51	235	371	4.60	7.27
1 to 2 years . . . . .	17	116	181	6.82	10.64
2 years or more . . . . .	30	228	398	7.60	13.26
Totals . . . . .	150	712	1,150		

From the above table can also be determined the average number of operations necessary for each succeeding year after the first to keep the mouth in repair. The result follows: Average number of operations per patient: 1st year, 7.27; 2d year, 3.37; 3d year, 2.62.

This reveals the rather interesting fact that after the first year the number of operations necessary to keep the mouth completed declines, and markedly so, as the length of hospitalization increases. This can be attributed to the value of the treatment afforded, namely: rest, plenty of fresh air and sunlight, and good diet, which seems to build up the general resistance of the patient which is evident in the decrease of dental infirmities, as there are fewer cavities and fewer infections of the oral tissues.

Following is a table of discharged cases showing percentage reduction of dental caries during hospitalization:

Total number of discharged patients examined . . . . .	150
Total number of teeth present on admission . . . . .	3,279
Total number of teeth carious on admission . . . . .	769
Average number of cavities present on admission . . . . .	23.45%
Total number of teeth present at discharge . . . . .	3,203
Total number of teeth carious at discharge . . . . .	312
Average number of caries present at discharge . . . . .	9.74%
Reduction of caries present during hospitalization . . . . .	13.71%

#### EDUCATION

At the close of the year 1931 the following patients were enrolled in our school work: Sixty-eight (68) girls between the ages of five and sixteen, 7 girls over sixteen, 49 boys between the ages of five and sixteen, and 2 boys over sixteen,—a total of 126, making up sixteen groups. During the latter part of the year follow-up letters were sent out to discharged pupils. The replies indicated in nearly every case that the child, upon his return to the community, was able to not only find his place but to satisfactorily maintain his proper standing with the pupils in the public school of his own age group.

The kindergarten work has been continued by members of the Occupational Therapy Department.

We have had an Americanization class this year, teaching English to adult foreign women. Needless to say they enjoy it very much.

We have two new teachers this year, both graduates of State Normal Schools, who are very enthusiastic about their work.

Formerly the librarian visited the Institution one-half day a week; however, because of the demands upon her time for extra reading material, as well as text books and other books for study in connection with the broader educational activities, it was necessary to increase her time to two one-half days each week. The value of this extra time is already being felt and meets a definite need.

During the early months of the year our Head Therapist carried on the work of the Occupational Therapy Department alone in the wards. In the early fall upon the completion of the occupational therapy shop an assistant therapist was added to the personnel and the shop opened. For the past three months classes have been conducted in the many various crafts for male and female patients who were in suitable physical condition to be permitted to go to the shop. The scope of the



work with the patient along educational and occupational therapy lines has been broadened to include instructions by means of State correspondence courses and vocational guidance, as well as some work of a rehabilitative nature.

These broader activities have been made possible by the cooperation of the Departments of Education, Occupational Therapy, Library, and Social Service which were brought together by your sincere and helpful interest in this problem. Conferences have been held regularly and have proven to be a real stimulus and of considerable interest. If the efforts as outlined above result in the training of even a few patients for new occupations, besides the value obtained from the therapeutic standpoint, this department will serve a very useful purpose.

Under the instruction and guidance of the therapists, the patients in the Men's, Women's, and Children's Wards have put on several interesting shows for the benefit of the strictly bed patients. Special classes have been conducted for the education of the blind patients and those with but a slight degree of vision. A French class has been organized, with the wife of one of our ministers as instructor. Classes in shorthand and typewriting have been conducted in the Women's Ward.

### FARM

The farm has had another successful year, the increased production at the dairy being especially noteworthy. The average production of milk per cow on two milkings daily was 11,962.7 pounds. The herd continues its accredited standing.

The poultry plant has had an exceptionally good year. This has been made possible in part by the new hen house built early in the year.

The patients have had an abundance of milk, eggs, poultry, meat, fruit and vegetables of our own production throughout the year.

### IMPROVEMENTS

Early in the year, nine additional single rooms, a new locker room, and a bathroom were added to both the Men's and Women's Wards. These single rooms relieved considerably the problem of properly handling very sick cases as well as the post-operative cases.

[The Superintendent's residence, the construction of which was started in the fall of 1930, was finished in April of this year and occupied the latter part of that month. This permitted the reconstruction of that portion of the Administration Building formerly used as the Superintendent's quarters into additional dining room space for employees, quarters for the Assistant Superintendent, and additional record and staff office space which had been badly needed for several years.

The East Cottage, which was of the open type of construction and formerly used by male ex-patients, was remodeled, providing five rooms for married employees.

New dish washing equipment has been installed to replace old style, worn-out apparatus. This equipment handles all dishes from the wards and the patients' dining room.

Terrazzo floors were laid in the diet kitchens of the Men's and Women's Wards and in the two bathrooms in the male employees' building.

### ENTERTAINMENT

Radio and moving pictures continue to be our chief source of entertainment. At various times during the year they have been augmented by plays and musical entertainments furnished by outside sources. A sanatorium paper entitled the "Cast" was started a few months ago and has proven to be interesting and amusing.

### RECOMMENDATIONS

Treatment rooms equipped with carbon arc lamps are needed in both the Men's and Women's Wards. While many patients are able to go to the Children's West Ward for lamp treatment during the inclement seasons, many of the patients who need the benefit of the lamps the most are unable to receive this form of treatment. The patients are not able to walk from one building to another and the number of employees needed to transport them by stretcher or wheel chair is prohibitive.

An infirmary building for the very sick men and women patients, especially the renal and abdominal types, is an outstanding need of the Sanatorium at this time

and our experience the past few years has convinced us that those patients, during certain stages of their disease, should be treated in that type of building rather than in open wards. Postoperative cases require the benefit of treatment in a room for at least a short time following their operation. This is especially true during the winter months.

#### ACKNOWLEDGMENTS

The chaplains of the various denominations have been most faithful during the past year in their duties, administering to the spiritual welfare of the patients at the Sanatorium. I extend to them my sincere appreciation as well as those of the patients and employees.

To the loyal and faithful employees I express my grateful appreciation for their assistance in carrying on the work during the past year which at many times has been of a most trying nature.

To our many outside friends, who so generously remembered the children in the Sanatorium at Christmas time and to the employees, who gave so freely of their own time during the Christmas season in making the stay of the patients as pleasant as possible, I extend our heartfelt thanks.

Your advice and confidence and that of other members of the Department during the past year has been most helpful and is appreciated.

Respectfully submitted,

LEON A. ALLEY, M.D.  
*Superintendent.*

### Inventory: Lakeville State Sanatorium

#### GRAND SUMMARY SHEET

November 30, 1931

#### REAL ESTATE

Land, 251.61 acres . . . . .	\$70,578 51	
Buildings . . . . .	789,082 17	
Betterments (additions and improvements) . . . . .	4,754 28	
		<u>\$864,414 96</u>

#### PERSONAL PROPERTY UNDISTRIBUTED SUPPLIES

Travel, transportation and office expenses . . . . .	\$391 56	
Food . . . . .	5,300 67	
Clothing and materials . . . . .	26 10	
Furnishings and household supplies . . . . .	2,063 79	
Medical and general care . . . . .	1,343 02	
Heat, light and power . . . . .	3,109 65	
Farm . . . . .	1,059 07	
Garage, stable and grounds . . . . .	154 46	
Repairs . . . . .	1,907 54	
Total . . . . .		<u>\$15,355 86</u>

#### PERSONAL PROPERTY DISTRIBUTED SUPPLIES

Travel, transportation and office expenses . . . . .	\$2,258 49	
Clothing and materials . . . . .	776 90	
Furnishings and household supplies . . . . .	51,872 24	
Medical and general care . . . . .	16,182 73	
Heat, light and power . . . . .	120 20	
Farm . . . . .	29,048 48	
Garage, stable and grounds . . . . .	4,436 95	
Repairs . . . . .	2,452 86	
Total . . . . .		<u>\$107,148 85</u>

#### GRAND SUMMARY

Real Estate, Total . . . . .	\$864,414 96	
Personal Property — Undistributed Supplies, Total . . . . .	15,355 86	
Personal Property — Distributed Supplies, Total . . . . .	107,148 85	
Grand Total . . . . .		<u>\$986,919 67</u>

## Financial Report, Lakeville State Sanatorium

### To the Department of Public Health:

I respectfully submit the following report of the finances of this institution for the fiscal year ending November 30, 1931.

### STATEMENT OF EARNINGS

Board of patients:		
Private	\$5,908 00	
Cities and Towns	110,924 00	
		\$116,832 00
Personal Services:		
Reimbursement from Board of Retirement		28 27
Sales:		
Food	\$148 11	
Furnishings and Household Supplies	3 15	
Medical and General Care	70 00	
Farm	1,052 06	
Garage, Stable and Grounds	73 78	
Arts and Crafts Sales	39 01	
		\$1,386 11
Total Sales		
Miscellaneous:		
Interest on bank balances	\$148 87	
		148 87
Total earnings for the year		\$118,395 25
Total cash receipts reverting and transferred to the State Treasurer		116,352 09
Accounts Receivable outstanding Dec. 1, 1930	\$25,186 16	
Accounts Receivable outstanding Nov. 30, 1931	27,229 32	
		\$2,043 16

### MAINTENANCE APPROPRIATION

Balance from previous year, brought forward		\$1,941 83
Appropriation, current year		\$295,850 00
		295,850 00
Total		\$297,791 83
Expenditures as follows:		
Personal services	\$166,698 93	
Food	35,658 85	
Medical and general care	11,856 79	
Farm	17,286 84	
Heat, light and power	12,596 25	
Garage, stable and grounds	3,579 68	
Travel, transportation and office expenses	3,160 78	
Religious instruction	1,370 00	
Clothing and materials	769 96	
Furnishings and household supplies	18,988 87	
Repairs, ordinary	3,019 02	
Repairs and renewals	8,156 85	
Total Maintenance Expenditures		\$283,142 82
Balance of Maintenance Appropriation, Nov. 30, 1931		14,649 01
Estimated Outstanding Liabilities, Nov. 30, 1931		\$4,264 94

### SPECIAL APPROPRIATIONS

Balance December 1, 1930, brought forward		\$25,646 59
Appropriations for current year		22,700 00
Total		\$48,346 59
Expended during the year (see statement below)	\$42,515 38	
Reverting to Treasury of Commonwealth	* 33 05	
(Star balances below that are reverting)		42,548 43
Balance November 30, 1931, carried to next year		\$5,798 16

APPROPRIATION	Act or Resolve	Total Amount Appropriated	Expended during Fiscal Year	Total Expended to Date	Balance at End of Year
New water supply	115-1930	\$6,800 00	-	\$6,005 91	\$794 09
Addition to fire protection	{ 146-1929 }	8,700 00			
	{ 115-1930 }	9,000 00	\$4,299 78	17,201 02	498 98
Children's building	146-1929	132,500 00	131 83	132,466 95	33 05*
Superintendent's home	115-1930	21,000 00	14,752 42	20,877 68	122 32
Alteration on Administration Building	115-1930	13,000 00	3,457 28	11,753 72	1,246 28
Alteration on two buildings	1-1931	17,000 00	14,721 81	14,721 81	2,278 19
Furnishings and equipment on Children's Building	115-1930	10,000 00	230 53	9,919 97	80 03
Repairs and improvements	1-1931	5,700 00	4,921 73	4,921 73	778 27
		\$223,700 00	\$42,515 38	\$217,868 79	\$5,831 21
Reverting					33 05
Carried forward to next year					\$5,798 16



## POPULATION

	ADULTS		CHILDREN		Totals
	Males	Females	Males	Females	
Number received during the year . . . . .	51	49	55	42	197
Number passing out of the institution during the year . . . . .	52	42	28	37	159
Number at end of the fiscal year in the institution . . . . .	49	52	112	74	287
Daily average attendance (number inmates actually present during the year) . . . . .	51.4	48.7	102.6	74.8	277.5
Average number of employees and officers during the year . . . . .	106.6	68	-	-	174.6

## PER CAPITA

During the year the average number of patients has been . . . . .	277.5369
Total cost of maintenance . . . . .	\$283,142.82
Equal to a weekly per capita cost of (52 weeks to year) . . . . .	19.6190
Total receipts for the year . . . . .	116,352.09
Equal to a weekly per capita of . . . . .	8.0621
Total net cost of maintenance for year (total maintenance less total receipts) . . . . .	166,790.73
Net weekly per capita . . . . .	11.5569

Respectfully submitted,

FLORENCE S. MONROE,

*Treasurer.*

## Statistical Tables

TABLE 1.—Admissions and Discharges

	ADULTS		CHILDREN		Totals
	Males	Females	Males	Females	
Patients in the Sanatorium Nov. 30, 1930 . . . . .	48	42	87	72	249
Patients admitted Dec. 1, 1930, to Nov. 30, 1931 . . . . .	51	49	55	42	197
Patients discharged Dec. 1, 1930, to Nov. 30, 1931 . . . . .	52	42	28	37	159
Patients remaining in the Sanatorium Nov. 30, 1931 . . . . .	49	52	112	74	287
Daily average number of patients . . . . .	51.4	48.7	102.6	74.8	277.5
Deaths (included in number discharged) . . . . .	9	1	4	5	19

TABLE 2.—Civil Condition of Patients Admitted

Single . . . . .	20	17	55	42	134
Married . . . . .	28	27	-	-	55
Widowed . . . . .	1	4	-	-	5
Divorced . . . . .	1	1	-	-	2
Separated . . . . .	1	-	-	-	1
Total . . . . .	51	49	55	42	197

TABLE 3.—Age of Patients Admitted

YEARS					
1 to 13 . . . . .	-	-	31	28	59
14 to 17 . . . . .	-	-	13	8	21
18 to 20 . . . . .	-	-	11	6	17
21 to 30 . . . . .	17	31	-	-	48
31 to 40 . . . . .	13	8	-	-	21
41 to 50 . . . . .	9	4	-	-	13
Over 50 . . . . .	12	6	-	-	18
Total . . . . .	51	49	55	42	197

TABLE 4.—*Nativity and Parentage of Patients Admitted*

PLACE OF NATIVITY	ADULTS						CHILDREN						TOTALS		
	MALES			FEMALES			MALES			FEMALES					
	Patient	Father	Mother	Patient	Father	Mother	Patient	Father	Mother	Patient	Father	Mother	Patient	Father	Mother
United States:															
Massachusetts	27	12	9	18	9	6	45	18	13	38	12	13	128	51	41
Other New England States	3	2	1	1	1	2	3	6	4	1	-	3	8	9	10
Other States	3	3	5	1	1	2	-	-	1	-	3	2	4	7	10
Total	33	17	15	20	11	10	48	24	18	39	15	18	140	67	61
Other Countries:															
Armenia	-	-	-	1	1	1	-	1	1	-	-	-	1	2	2
Austria	1	1	1	-	-	-	-	-	-	-	-	-	1	1	1
Barbadoes	-	-	-	-	-	-	-	1	1	-	-	-	-	1	1
Belgium	-	-	-	-	-	-	-	-	1	-	-	-	-	-	1
Bohemia	-	-	-	1	1	1	-	-	-	-	-	-	1	1	1
Canada	4	6	5	10	12	12	4	4	7	2	2	4	20	24	28
China	-	-	-	-	-	-	-	-	-	-	1	1	-	1	1
England	1	4	3	-	-	-	-	-	1	-	2	1	1	6	5
Finland	-	-	-	1	1	1	-	-	-	-	-	-	1	1	1
Germany	1	1	1	-	1	1	-	-	-	-	1	1	1	3	3
Greece	1	1	1	1	1	1	-	-	-	-	-	-	2	2	2
Ireland	-	5	8	6	7	9	-	3	4	1	3	2	7	18	23
Italy	4	6	6	1	2	2	1	8	9	-	8	7	6	24	24
Latvia	-	-	-	1	1	1	-	-	-	-	-	-	1	1	1
Lithuania	-	-	-	-	1	1	-	1	1	-	-	-	-	2	2
Newfoundland	-	1	-	-	-	-	-	-	-	-	2	1	-	3	1
Poland	3	3	3	1	1	1	1	1	1	-	4	4	5	9	9
Portugal	-	1	1	-	-	-	-	5	5	-	1	1	-	7	7
Russia	3	4	3	2	3	3	-	4	4	-	1	1	5	12	11
Scotland	-	-	1	1	1	1	-	-	-	-	1	-	1	2	2
Sweden	-	1	1	2	2	2	-	-	-	-	-	-	2	3	3
Turkey	-	-	-	1	1	1	-	-	-	-	-	-	1	1	1
Unknown	-	-	2	-	2	1	1	3	2	-	1	1	1	6	6
Totals	51	51	51	49	49	49	55	55	55	42	42	42	197	197	197

TABLE 5.—*Residence of Patients Admitted*

	Adults	Children	Totals		Adults	Children	Totals
Amesbury	2	-	2	Maynard	-	1	1
Arlington	1	-	1	Medford	-	1	1
Attleboro	-	1	1	Medway	1	-	1
Auburn	1	-	1	Melrose	2	1	3
Belmont	2	-	2	Methuen	1	-	1
Beverly	-	1	1	Middleboro	1	-	1
Boston	27	35	62	New Bedford	3	3	6
Boylston	-	1	1	Newburyport	-	1	1
Brockton	3	4	7	Newton	4	2	6
Brookline	1	-	1	North Adams	3	1	4
Cambridge	5	5	10	North Reading	-	1	1
Carver	-	1	1	Northampton	1	1	2
Chelsea	1	-	1	Norwood	1	1	2
Concord	1	-	1	Onset	-	1	1
Dover	1	-	1	Pittsfield	-	1	1
Easthampton	1	-	1	Reading	-	1	1
Everett	2	-	2	Revere	1	-	1
Fairhaven	1	-	1	Somerville	8	1	9
Fall River	-	2	2	Shrewsbury	1	-	1
Fitchburg	-	1	1	Southbridge	1	-	1
Framingham	-	3	3	Springfield	2	2	4
Gloucester	2	-	2	Stoughton	1	2	3
Grafton	-	1	1	Swansea	1	-	1
Great Barrington	-	1	1	Taunton	-	2	2
Haverhill	-	1	1	Upton	1	-	1
Holyoke	-	1	1	Waltham	-	1	1
Hudson	2	-	2	Ware	-	1	1
Kingston	1	-	1	Watertown	1	1	2
Lawrence	2	2	4	Weymouth	2	-	2
Leominster	1	-	1	Westfield	-	1	1
Lynn	2	3	5	Whitman	1	1	2
Malden	2	2	4	Worcester	1	3	4
Mansfield	1	-	1				
Marion	-	1	1				
					100	97	197

TABLE 6.—Occupations of Patients Admitted

	ADULTS		CHILDREN		Totals
	Males	Females	Males	Females	
Architect . . . . .	1	—	—	—	1
Assistant grounds keeper . . . . .	1	—	—	—	1
Attendant nurse . . . . .	—	2	—	—	2
Barrel dealer . . . . .	1	—	—	—	1
Candy dipper . . . . .	1	—	—	—	1
Cashier . . . . .	—	1	—	—	1
Chauffeur . . . . .	2	—	—	—	2
Child . . . . .	—	—	16	12	28
Cigar maker . . . . .	1	—	—	—	1
Clerk: Music store . . . . .	—	1	—	—	1
Office . . . . .	1	1	—	—	2
Sales . . . . .	—	1	1	—	2
Stock . . . . .	1	—	—	—	1
Storeroom . . . . .	1	—	—	—	1
Supply . . . . .	1	—	—	—	1
Clothing examiner . . . . .	—	1	—	—	1
Comb driller . . . . .	1	—	—	—	1
Cook . . . . .	—	—	—	1	1
Counterman . . . . .	—	—	1	—	1
Director of arts in public school . . . . .	1	—	—	—	1
Furniture finisher . . . . .	1	—	—	—	1
Garage doorman . . . . .	1	—	—	—	1
Gardner . . . . .	—	—	1	—	1
Grinder on carding machine . . . . .	1	—	—	—	1
At home . . . . .	—	5	1	1	7
Housemaid . . . . .	—	1	—	1	2
Housewife . . . . .	—	27	—	—	27
Housework . . . . .	—	5	—	1	6
Junk dealer . . . . .	1	—	—	—	1
Kitchen helper . . . . .	—	—	1	—	1
Laborer . . . . .	6	—	—	—	6
Laundry worker . . . . .	—	1	—	—	1
Lawyer . . . . .	1	—	—	—	1
Layer-out in a shipyard . . . . .	1	—	—	—	1
Librarian, hospital records . . . . .	—	1	—	—	1
Mechanic . . . . .	3	—	—	—	3
Merchant marine . . . . .	1	—	—	—	1
Nurse maid . . . . .	—	—	—	1	1
Painter . . . . .	1	—	—	—	1
Paper boy . . . . .	—	—	1	—	1
Paper factory worker . . . . .	1	—	—	—	1
Peddler, dry goods . . . . .	1	—	—	—	1
Peddler, fruit and vegetables . . . . .	1	—	—	—	1
Pharmacist, registered . . . . .	1	—	—	—	1
Policeman . . . . .	1	—	—	—	1
Polisher of optical lenses . . . . .	1	—	—	—	1
Porter . . . . .	1	—	—	—	1
Putty packer . . . . .	—	—	1	—	1
Salesman, automobile . . . . .	1	—	—	—	1
Salesman, milk . . . . .	1	—	—	—	1
Sawmill owner . . . . .	2	—	—	—	2
Schoolboy . . . . .	—	—	28	—	28
Schoolgirl . . . . .	—	—	—	23	23
Student, art school . . . . .	—	—	1	—	1
Student, electrical school . . . . .	—	—	1	—	1
Student, nurse . . . . .	—	—	—	1	1
Shoe counter factory . . . . .	1	—	—	—	1
Shoe cutter . . . . .	2	—	—	—	2
Shoe laster . . . . .	1	—	—	—	1
Shoemaker . . . . .	1	—	—	—	1
Stenographer . . . . .	—	2	—	—	2
Supply boy in restaurant . . . . .	—	—	1	—	1
Taxi driver . . . . .	2	—	—	—	2
Toolmaker . . . . .	1	—	—	—	1
Truck driver . . . . .	1	—	—	—	1
Upholsterer . . . . .	—	—	1	—	1
Waitress . . . . .	—	—	—	1	1
Woolen mill, dyer . . . . .	1	—	—	—	1
	51	49	55	42	197

Number of occupations, 68.



TABLE 7.—*Stage of Disease on Admission*

	ADULTS		CHILDREN		Totals	Per-centage
	Males	Females	Males	Females		
<i>One Lesion</i>						
Tb. adenitis, cervical . . . . .	1	2	3	2	8	4.06
Tb. adenitis, mesenteric . . . . .	—	—	2	1	3	1.52
Tb. ankle . . . . .	—	—	1	—	1	.51
Tb. chorioretinitis . . . . .	1	—	—	—	1	.51
Tb. colitis . . . . .	—	1	—	—	1	.51
Tb. elbow . . . . .	—	1	—	—	1	.51
Tb. empyema . . . . .	1	1	—	—	2	1.01
Tb. fibula . . . . .	1	—	—	—	1	.51
Tb. foot . . . . .	—	1	1	—	2	1.01
Tb. hip . . . . .	3	3	6	3	15	7.61
Lupus vulgaris . . . . .	1	—	—	1	2	1.01
Tb. knee . . . . .	1	1	4	1	7	3.55
Tb. mastoiditis . . . . .	—	—	2	—	2	1.01
Tb. nephritis . . . . .	4	3	2	—	9	4.56
Tb. ophthalmia . . . . .	—	2	—	4	6	3.04
Tb. pericarditis . . . . .	—	—	1	—	1	.51
Tb. peritonitis . . . . .	5	9	4	12	30	15.22
Pulmonary Tb. . . . .	1	—	—	—	1	.51
Tb. sacro-iliac . . . . .	1	1	—	—	2	1.01
Tb. spine . . . . .	12	11	12	4	39	19.79
Tracheobronchial Tb. . . . .	—	—	1	—	1	.51
	32	36	39	28	135	
<i>Two Lesions</i>						
Tb. adenitis, cervical and axillary . . . . .	—	1	—	—	1	.51
Tb. adenitis, cervical, Tb. dactylitis . . . . .	—	—	—	1	1	.51
Tb. adenitis, cervical, Tb. epididymitis . . . . .	—	—	1	—	1	.51
Tb. adenitis, cervical, Tb. mastoiditis . . . . .	—	—	—	1	1	.51
Tb. adenitis, cervical and mesenteric . . . . .	—	—	1	—	1	.51
Tb. adenitis, cervical, Tb. spine . . . . .	1	—	1	—	2	1.01
Tb. ankle, Tb. os calcis . . . . .	—	—	1	—	1	.51
Tb. bowels, pulmonary Tb. . . . .	1	—	—	—	1	.51
Tb. dactylitis, Tb. jaw . . . . .	—	—	—	1	1	.51
Tb. dactylitis, Tb. os calcis . . . . .	—	—	1	—	1	.51
Tb. hips . . . . .	—	—	1	—	1	.51
Tb. hip, Tb. greater trochanter . . . . .	1	—	—	—	1	.51
Tb. hip, Tb. orchitis . . . . .	1	—	—	—	1	.51
Tb. hip, pulmonary Tb. . . . .	3	—	—	—	3	1.52
Tb. hip, Tb. sacro-iliac . . . . .	—	—	—	1	1	.51
Tb. hip, Tb. spine . . . . .	—	—	—	1	1	.51
Tb. knee, hilum Tb. . . . .	—	—	—	1	1	.51
Tb. mastoiditis, Tb. otitis media . . . . .	—	—	1	—	1	.51
Tb. mastoiditis, pulmonary Tb. . . . .	—	—	—	1	1	.51
Tb. nephritis, Tb. cystitis . . . . .	1	—	—	—	1	.51
Tb. nephritis, Tb. spine . . . . .	1	2	—	—	3	1.52
Tb. ophthalmia, Tb. adenitis cervical . . . . .	—	—	—	1	1	.51
Tb. ophthalmia, hilum Tb. . . . .	—	—	1	1	2	1.01
Tb. orchitis, Tb. epididymitis . . . . .	—	—	1	—	1	.51
Tb. peritonitis, Tb. fistulae in ano . . . . .	1	—	—	—	1	.51
Tb. peritonitis, Tb. sacro-iliac . . . . .	—	1	—	—	1	.51
Tb. proctitis, pulmonary Tb. . . . .	—	1	—	—	1	.51
Tb. sacro-iliac, Tb. peritonitis . . . . .	—	—	—	1	1	.51
Tb. sacro-iliac, Pulmonary Tb. . . . .	1	—	—	—	1	.51
Tb. spine, Tb. ankle . . . . .	—	1	—	—	1	.51
Tb. spine, Tb. hip . . . . .	—	2	—	1	3	1.52
Tb. spine, Tb. knee . . . . .	1	—	—	1	2	1.01
Tb. spine, pulmonary Tb. . . . .	1	1	1	—	3	1.52
Tb. spine, Tb. ulna . . . . .	—	—	—	1	1	.51
Tb. radius, Tb. knee . . . . .	—	—	1	—	1	.51
	13	9	11	13	46	—
<i>Three Lesions</i>						
Tb. abscess abdominal wall, Tb. epididymitis, pulmonary Tb. . . . .	1	—	—	—	1	.51
Tb. adenitis, axillary, cervical, and inguinal . . . . .	—	—	1	—	1	.51
Tb. spine, Tb. elbow, pulmonary Tb. . . . .	—	1	—	—	1	.51
	1	1	1	—	3	—
<i>Four Lesions</i>						
Tb. knee, Tb. ankle, Tb. hip, pulmonary Tb. . . . .	1	—	—	—	1	.51

TABLE 7.—*Stage of Disease on Admission—(Concluded)*

	ADULTS		CHILDREN		Totals	Percentage
	Males	Females	Males	Females		
<i>Non-tuberculous</i>						
Abdominal malignancy . . .	—	—	—	1	1	.51
Arthritis . . .	—	1	—	—	1	.51
Epithelioma (Grade 2) . . .	1	—	—	—	1	.51
Eyes . . .	—	1	—	—	1	.51
Hip . . .	—	—	1	—	1	.51
Osteomyelitis . . .	1	—	—	—	1	.51
Pes cavus . . .	—	—	1	—	1	.51
Syphilis . . .	1	1	—	—	2	1.01
Varicose veins . . .	1	—	—	—	1	.51
Unclassified . . .	—	—	2	—	2	1.01
	4	3	4	1	12	—

TABLE 8.—*Condition on Discharge*

	ADULTS		CHILDREN		Totals	Percentage
	Males	Females	Males	Females		
Arrested . . .	8	13	10	21	52	32.70
Apparently arrested . . .	—	—	1	—	1	.63
Quiescent . . .	10	—	5	1	16	10.06
Improved . . .	14	21	1	6	42	26.42
Unimproved . . .	—	3	1	—	4	2.52
Deaths . . .	9	1	4	5	19	11.95
Not considered . . .	6	1	2	1	10	6.29
Non-tuberculous . . .	5	3	4	3	15	9.43
	52	42	28	37	159	—

TABLE 9.—*Deaths*

DURATION OF DISEASE	ADULTS		CHILDREN		Totals	LENGTH OF RESIDENCE IN SANATORIUM				
	Males	Fe-males	Males	Fe-males		ADULTS		CHILDREN		Total
Males					Fe-males	Males	Fe-males			
Less than 1 month	—	1	—	—	1	2	—	—	—	2
1 to 2 . . .	—	—	—	—	—	1	1	—	—	2
2 to 3 . . .	—	—	—	—	—	—	—	—	—	—
3 to 4 . . .	—	—	—	—	—	—	—	—	—	—
4 to 5 . . .	1	—	—	—	1	1	—	—	—	1
5 to 6 . . .	—	—	—	—	—	—	—	—	—	—
6 to 7 . . .	—	—	—	—	—	—	—	1	—	1
7 to 8 . . .	—	—	—	—	—	—	—	1	—	1
8 to 9 . . .	1	—	—	—	1	—	—	—	—	—
9 to 10 . . .	—	—	—	—	—	—	—	—	—	—
10 to 12 . . .	—	—	—	—	—	2	—	—	—	2
12 to 18 . . .	—	—	—	—	—	1	—	—	2	3
18 to 24 . . .	—	—	1	—	1	—	—	—	—	—
Over 2 years . . .	7	—	3	5	15	2	—	2	3	7
	9	1	4	5	19	9	1	4	5	19

TABLE 10.—*Cause of Death*

	ADULTS		CHILDREN		Totals
	Males	Females	Males	Females	
Tb. ankles; Tb. adenitis cervical, Tb. peritonitis, Tb. meningitis . . .	—	—	—	1	1
Tb. ankle, Tb. wrist, Tb. spine, amyloidosis, Tb. peritonitis . . .	—	—	—	1	1
Tb. enteritis, pulmonary Tb. . . .	—	1	—	—	1
Tb. hip . . .	—	—	1	—	1
Tb. hip, Tb. meningitis, amyloid disease . . .	—	—	1	—	1
Tb. hip, Tb. meningitis, bronchial pneumonia . . .	—	—	1	—	1
Tb. hip, Tb. peritonitis, Tb. meningitis . . .	1	—	—	—	1
Osteomyelitis . . .	1	—	—	—	1
Tb. peritonitis . . .	1	—	—	—	1
Tb. sacro-iliac, Tb. peritonitis, amyloid disease, Tb. meningitis . . .	—	—	—	1	1
Tb. spine . . .	2	—	1	—	3
Tb. spine, Tb. adenitis cervical, chronic parenchymatous nephritis, chronic myocarditis . . .	1	—	—	—	1
Tb. spine, Tb. hip . . .	—	—	—	1	1
Tb. spine, Tb. meningitis . . .	1	—	—	—	1
Tb. spine, osteomyelitis left mandible . . .	1	—	—	—	1
Tb. spine, Tb. wrist, pulmonary Tb. . .	1	—	—	—	1
Tb. spine, amyloid disease, hydropericardium . . .	—	—	—	1	1
	9	1	4	5	19

## NORTH READING STATE SANATORIUM

CARL C. MACCORISON, M.D., *Sanatorium Superintendent.*  
 EARLE C. WILLOUGHBY, M.D., *Assistant Superintendent.*  
 GERALD H. CARON, M.D., *Assistant Physician.*  
 ANNA H. MAXWELL, M.D., *Assistant Physician.*  
 JAMES H. POWERS, D.M.D., *Dentist.*  
 ETHEL M. KNIGHT, *Principal Bookkeeper and Treasurer.*

ELLEN MURRAY, R.N., *Principal of School of Nursing.*  
 ELIZABETH HASLETT, *Head Housekeeper.*  
 BEULAH F. PHILBROOK, *Head School Teacher.*  
 J. ELLIS DOUCETTE, *Sanatorium Steward.*  
 DANIEL J. SCOTT, *Chief Power Plant Engineer.*  
 EDWARD J. LEARY, *Head Farmer.*

## Report of the Superintendent

TO GEORGE H. BIGELOW, M.D., *Commissioner, Department of Public Health:*

I have the honor of submitting the twenty-first annual report of the North Reading State Sanatorium for the year ending November 30, 1931.

A comparison of the statistical tables of this year with those of 1930 shows in Table VIII a marked decrease in the number of apparently well, arrested, apparently arrested, and quiescent cases over those of last year. This difference can be explained in that we have had fewer patients admitted who were classified as malnutrition, and "no disease"; cases diagnosed as such are always classified as apparently well on discharge.

The average duration of residence for the past year was three months less than that of the previous year. This alone would account for a smaller number being discharged as arrested, inasmuch as no child is considered arrested until six months have elapsed without evidence of signs or symptoms.

In 1930 there were admitted to the Sanatorium 63 adult type cases of tuberculosis as against 44 cases during the past year. This decrease in the number of adult type cases admitted is due largely to the fact that certain cases now classified as childhood type, Group I, i.e., those cases in whom the lesion is predominantly parenchymal, were previously classified as minimal or moderately advanced.

On December 2, 1930, a case of scarlet fever was found in Pavilion C East. Approximately forty boys on this pavilion were exposed as well as numerous little girls in the school. The second case developed ten days later on Pavilion B East. In all, we had a total of eleven cases, the last developing the disease January 6, 1931. Strange to say, this epidemic did not extend beyond the boys' unit, although there had been contact between the boys and girls at the school.

On February 25, 1931, a little girl on Pavilion B West developed scarlet fever, and on March 3rd one of the nurses in charge of the case came down with the disease. On May 27, another little girl on Pavilion B West contracted the disease, also one on June 22 and 29th respectively. We were unable to trace any connection between these cases. They were extremely mild and no complications resulted.

Chicken pox developed on Pavilion B West on May 26th. From this date until August 2nd we had forty-four cases. We were unable to trace the original source of this epidemic.

On July 17th a case of German measles appeared in our babies' ward. Although the entire ward was exposed, no further cases resulted from this exposure.

On August 4th a girl in the West Ward developed German measles but fortunately no other patients contracted the disease.

The experience of the past year has demonstrated very clearly the value of our new Isolation and Admitting Building. With the prompt isolation of suspicious cases and the segregation of exposed children on the pavilion, it is now possible to keep an epidemic within reasonable limits.

It is most gratifying to report that no cases of cross-infection occurred in the Hospital and Isolation Building during the year.



On November 1, 1931, we opened an affiliating course of three months in pediatrics and infant feeding with the Rutland State Sanatorium Training School. The students receive from the medical staff ten lectures in pediatrics, eight in infant feeding, one in dentition and six in aseptic technique, in addition to the general instruction and quizzes conducted by our superintendent of nurses.

As time goes on we are more and more confronted with the problems of the non-cooperative and feeble-minded child. These children may be classified in two groups: first, those who are definitely mentally deficient or on the border line; second, those who through previous environment are ill adapted to sanatorium life. Children in either of these groups are a great source of trouble. They will not take treatment, they disturb the other children, and prevent them from taking proper rest, and by their misconduct are unsuitable companions for the normal child.

The children of the first group are a potential danger to themselves and others.

The best solution of this problem would be the removal of the mentally deficient, especially those of the problem type, to an institution for the feeble-minded. For the second group a special unit under the supervision of an especially trained corps of workers should be provided.

Our records show that an increasing number of children with active or potentially active childhood tuberculosis are being admitted. This means that a larger group requires more prolonged bed treatment. For the children who are unable to attend school, we believe occupational therapy should be considered. This, of course, would necessitate the addition of one or two more teachers.

Dr. Cooper of the Department of Mental Diseases and her associates held eight clinics at the Sanatorium. Thirty-eight children attended these clinics, thirty-two of whom were of school age and six preschool age. Application has been made for the admission of four of these children to a school for the mentally deficient. Dr. Cooper and her associates have been most helpful to us and we have derived much benefit from these clinics.

Ten eye, ear, nose and throat clinics were held during the year by Drs. Odoneal and DeWolfe. Approximately 130 children were referred to these clinics. Fifty-five patients were fitted with glasses and eighteen children had their tonsils and adenoids removed. A tenotomy was performed on one little girl for internal strabismus.

### CLINICS

The following number of patients were examined in the Out-Patient and Consultation Clinics:

	Positive	Negative	Suspicious	Total
Consultation Clinic . . . . .	28	3	102	133
Out-Patient Clinic . . . . .	116	9	517	642
Out-Patient X-rays . . . . .	-	-	-	638

### DENTAL REPORT

The following table is a summary of the work done during the year. Prophylactic treatments, 945; fillings (perm. teeth), 343; fillings (temp. teeth), 225; extractions (perm. teeth), 385; extractions (temp. teeth), 996; treatments, 478; restorations, 12; X-ray, 309; irrigations, 454; visits, 2,826; new patients, 353; dismissals, 619.

In those children whose teeth showed advanced condition of caries, an attempt was made to overcome this condition by adding to their diet an extra amount of orange and tomato juice, as well as raw cabbage and sauerkraut.

A careful survey of this group over a period of five months showed that the advancement of the present caries and the formation of new caries were greatly reduced.

### LABORATORY REPORT

The following examinations were made in our laboratory: Sputum examinations: (positive, 246; negative, 747) 993; urine analyses, 1,843; white blood counts, 106; red blood counts, 46; differential blood counts, 92; Babcock tests for milk, 45; bacterial plate counts for milk, 44; throat cultures, 37; other cultures and smears, 43; widal tests, 118; gastric contents, 2; spinal fluid, 3.

During the year there has been expended for maintenance \$243,280.46, a gross weekly per capita cost of \$17.80. There has been collected from miscellaneous sources \$73,293.61 (the total of all collections). Deducting this amount from the gross maintenance expenses leaves a net expense of \$169,986.85. The net weekly per capita cost was \$12.44. There has been collected from private funds \$4,045; from cities and towns \$67,065. Twenty-three cases (including fourteen from the Division of Child Guardianship) were supported by private funds; 342 by cities and towns, and 87 wholly by the State.

There were 248 patients at the beginning of the fiscal year, and 274 at the close. The largest number present at any one time was 279 and the smallest number 239. The daily average number of patients was 262.81 as against 226.12 last year. There were 280 patients admitted during the year, 16 less than last year.

There were 240 cases admitted from cities and towns of over 25,000 population, and 40 cases from cities and towns under 25,000 population. The average age of patients was 9.08 years—a little below last year. Including deaths, there were 254 cases discharged, and the average duration of residence was 9 months. Of those discharged 221 gained 2,257½ lbs.,—an average gain of 10.2 lbs. per person.

Of the discharges there were 31 apparently well cases; 85 apparently arrested; 69 arrested; 13 quiescent; 18 improved; 18 unimproved; 9 not considered—the duration of treatment being less than thirty days. There were 11 deaths—12 less than last year. There were 95,926 hospital days.

The following table shows the classification on the application blank and our classification on admission:

	Classification on Application Blanks	Our Classification on Admission
Hilum tuberculosis . . . . .	178	192
Minimal . . . . .	36	14
Moderately advanced . . . . .	27	19
Advanced . . . . .	5	11
Bronchiectasis . . . . .	1	0
Chronic cardiac valvular disease . . . . .	0	1
Malnutrition . . . . .	0	9
No disease . . . . .	0	13
Empyema . . . . .	0	2
Lung abscess . . . . .	1	1
Hypertrophied tonsils . . . . .	0	1
Pleurisy with effusion . . . . .	3	2
Incipient . . . . .	2	0
Miliary tuberculosis . . . . .	1	0
Tuberculous cervical glands . . . . .	1	0
Pulmonary tuberculosis . . . . .	2	0
Observation . . . . .	2	0
Tuberculosis of meninges . . . . .	0	1
Tuberculosis of pleura . . . . .	0	1
Unclassified . . . . .	21	4
Deferred . . . . .	0	9

#### SCHOOL STATISTICS

	Average Daily Attendance	Per Cent of Attendance	Total Membership
Grade I . . . . .	21.99	90	56
Grade II . . . . .	24.18	91	70
Grades III and IV . . . . .	33.92	92	127
Grades V and VI . . . . .	32.31	94	69
Grades VII and VIII . . . . .	27.09	95	109
High school . . . . .	18.74	90	72

Average daily attendance for school . . . . .	147.42
Per cent of attendance for school . . . . .	92
Total enrollment for school . . . . .	436

Miss Beulah F. Philbrook was appointed to take charge of the school department, and came to the Sanatorium at the beginning of the school year, September first. Her work deals primarily with the defective and problem children. A regular special-class has been organized for the defectives, and classes in wood-working and finishing, leather craft, paper construction and clay modeling have been established for the problem cases. The object is to study the individual who is a misfit either in school or ward routine to determine his particular aptitudes and then encourage work along those lines. Already a marked change has taken place in two or three children. They have won respect and thus satisfied their desire for attention through achievement instead of mischievousness.

In the near future we hope to have many other branches of handwork such as metal work, art needlework, basketry, cookery, knitting and crocheting.

#### IMPROVEMENTS

Additions were made to the diet kitchens on East and West wards and new equipment added.

A new terrazzo floor was laid in the children's main dining room.

The paint shop and laundry was fireproofed and sprinklers installed.

A new sewer line was put in connecting the Steward and Engineer's Cottage with the sewage system.

Five new electric refrigerators were installed, also a new eight ton ice compressor.

A new gravel roof was laid over the patients' dining room, pavilion verandas repaired and a new cement veranda installed at Pavilion A East.

The Employees' Building and the addition to the Nurses' Hall were completed and are now occupied.

Sprinklers were installed in the Nurses' Hall, Administration Building, Medical Building and East and West Wards.

The Administration Building was rewired throughout.

The large henhouse was reshingled with asphalt shingles.

Work has been started on replacing our old worn out 25 and 35 KW generating units with secondhand 50 and 75 KW units.

A small part of the work necessary for replacing hot and cold water lines throughout the institution was done.

#### RECOMMENDATIONS

If the new cottage for the superintendent is to be approved, the office floor and old quarters of the superintendent in the Administration Building should be remodeled to provide better office facilities and accommodations for the staff.

Seven additional filter beds are greatly needed, and land for water supply.

Many of the hot and cold water lines in the schoolhouse should be replaced, extensive veranda repairs made, and food trucks purchased for the East and West Wards.

#### CONCLUSION

During the year Dr. Dorothea Whitney was forced to resign owing to ill health. Dr. Anna H. Maxwell was appointed to the vacancy on July 1st.

I wish to express my gratitude to our chaplains for the good work which they have carried on, the Reverend Father Brown, the Reverend Mr. Park and Rabbi Zeldner.

To the many friends of the Sanatorium I want to express my appreciation for the many gifts of books, magazines, toys, etc., and I also want to thank the numerous groups who have come to the Sanatorium to entertain the children.

Again it is a pleasure to acknowledge the cooperation and assistance of the heads of departments and the other employees.

Respectfully submitted,

CARL C. MACCORISON,  
*Superintendent.*



## Inventory: North Reading State Sanatorium

## GRAND SUMMARY SHEET

November 30, 1931.

## REAL ESTATE

Land, 101.75 acres . . . . .	\$4,901 30	
Buildings . . . . .	665,997 52	
Betterments (additions and improvements) . . . . .	145,203 82	
Total . . . . .		\$816,102 64

## PERSONAL PROPERTY UNDISTRIBUTED SUPPLIES

Travel, Transportation and Office Expenses . . . . .	\$187 65	
Food . . . . .	2,695 37	
Clothing and materials . . . . .	3,166 43	
Furnishings and household supplies . . . . .	3,037 16	
Medical and general care . . . . .	518 65	
Heat, light and power . . . . .	6,810 11	
Farm . . . . .	235 71	
Garage, stable and grounds . . . . .	118 99	
Repairs . . . . .	122 90	
Total . . . . .		\$16,892 97

## PERSONAL PROPERTY DISTRIBUTED SUPPLIES

Travel, transportation and office expenses . . . . .	\$4,232 19	
Clothing and materials . . . . .	1,746 81	
Furnishings and household supplies . . . . .	76,392 29	
Medical and general care . . . . .	17,876 33	
Heat, light and power . . . . .	75	
Farm . . . . .	11,212 74	
Garage, stable and grounds . . . . .	6,546 95	
Repairs . . . . .	6,105 53	
Total . . . . .		\$124,113 59

## GRAND SUMMARY

Real Estate — Total . . . . .	\$816,102 64	
Personal Property — Undistributed Supplies, Total . . . . .	16,892 97	
Personal Property — Distributed Supplies, Total . . . . .	124,113 59	
Grand total . . . . .		\$957,109 20

## Financial Report, North Reading State Sanatorium, 1931

*To the Department of Public Health:*

I respectfully submit the following report of the finances of this Institution for the fiscal year ending November 30, 1931.

## STATEMENT OF EARNINGS

Board of patients:		
Private . . . . .	\$4,045 00	
Cities and towns . . . . .	67,065 00	
		\$71,110 00
Personal services:		
Reimbursement from Board of Retirement . . . . .		86 27
Sales:		
Food . . . . .	\$106 60	
Clothing and materials . . . . .	283 29	
Furnishings and household supplies . . . . .	102 39	
Medical and general care . . . . .	212 32	
Farm . . . . .	88 80	
Garage, stable and grounds . . . . .	46 12	
Miscellaneous, junk . . . . .	95 56	
Total sales . . . . .		\$935 08
Miscellaneous:		
Interest on bank balances . . . . .	\$256 27	
Reimbursement for damages . . . . .	15 00	
Total, miscellaneous . . . . .		\$271 27
Total earnings for the year . . . . .		\$72,402 62
Total cash receipts reverting and transferred to the State Treasurer . . . . .		73,226 93
Accounts receivable outstanding Dec. 1, 1930 . . . . .	\$18,024 97	
Accounts receivable outstanding Nov. 30, 1931 . . . . .	17,200 66	
Accounts receivable decreased . . . . .		824 31

## MAINTENANCE APPROPRIATION

Balance from previous year, brought forward . . . . .		\$2,867 68
Appropriation, current year . . . . .	\$250,900 00	250,900 00
Total . . . . .		\$253,767 68
Expenditures as follows:		
Personal services . . . . .	\$147,952 08	
Food . . . . .	39,754 53	
Medical and general care . . . . .	6,335 93	
Farm . . . . .	3,384 38	
Heat, light and power . . . . .	16,146 75	
Garage, stable and grounds . . . . .	3,917 95	
Travel, transportation and office expenses . . . . .	2,764 77	
Religious instruction . . . . .	1,600 00	
Clothing and materials . . . . .	2,487 77	
Furnishings and household supplies . . . . .	6,286 54	
Repairs ordinary . . . . .	4,157 85	
Repairs and renewals . . . . .	8,491 91	
Total Maintenance Expenditures . . . . .		\$243,280 46
Balance of Maintenance Appropriation, Nov. 30, 1931 . . . . .		\$10,487 22
Estimated Outstanding Liabilities, Nov. 30, 1931 . . . . .		\$2,613 67

## SPECIAL APPROPRIATIONS

Balance December 1, 1930, brought forward . . . . .		\$89,543 87
Appropriations for current year . . . . .		14,300 00
Total . . . . .		\$103,843 87
Expended during the year (see statement below) . . . . .	\$92,688 40	
Reverting to Treasury of Commonwealth . . . . .		92,688 40
Balance November 30, 1931, carried to next year . . . . .		\$11,155 47

APPROPRIATION	Act or Resolve	Total Amount Appropriated	Expended during Fiscal Year	Total Expended to Date	Balance at End of Year
Addition to Nurses' Home . . . . .	1930	\$20,000 00	\$14,516 16	\$19,882 12	\$117 88
Employees' Building . . . . .	1930	75,000 00	54,970 39	68,831 33	6,168 67
Power House alterations . . . . .	1929				
	1930	40,000 00	4,164 40	39,999 71	.29
Improvement of water supply and fire protection . . . . .	1929				
	1930	42,700 00	9,773 63	40,748 15	1,951 85
	1931				
Addition to dining room . . . . .	1930	4,000 00	-	3,986 43	13 57
Administration and Isolation Building . . . . .	1929	172,000 00	664 25	169,097 22	2,902 78
Repairs and improvements . . . . .	1931	8,600 00	8,599 57	8,599 57	.43
		\$362,300 00	\$92,688 40	\$351,144 53	\$11,155 47

## POPULATION

	Males	Females	Total
Number received during year . . . . .	138	142	280
Number passing out of Institution during year . . . . .	120	134	254
Number at end of fiscal year in Institution . . . . .	140	134	274
Daily average attendance (number of inmates actually present during year) . . . . .	132.15	130.66	262.81
Average number of employees and officers during year . . . . .	62.47	86.84	149.31

## PER CAPITA

During the year the average number of patients has been . . . . .	262 81
Total cost of maintenance . . . . .	\$243,280 46
Equal to a weekly per capita cost of (52 weeks to year) . . . . .	17 8017
Total receipts for the year . . . . .	\$73,226 93
Equal to a weekly per capita of . . . . .	5.3583
Total net cost of maintenance for year (total maintenance less total receipts) . . . . .	\$170,053 53
Net weekly per capita . . . . .	12.4434

Respectfully submitted,

ETHEL M. KNIGHT,  
Treasurer.

## Statistical Tables

TABLE 1.—Admissions and Discharges

	Males	Females	Totals
Patients in Sanatorium Dec. 1, 1930	122	126	248
Patients admitted from Dec. 1, 1930, to Nov. 30, 1931, incl.	138	142	280
Patients discharged from Dec. 1, 1930, to Nov. 30, 1931, incl.	120	134	254
Patients remaining in Sanatorium Nov. 30, 1931	140	134	274
Daily average number patients	132.15	130.66	262.81
Deaths (included in number discharged)	6	5	11

TABLE 2.—Civil Condition of Patients Admitted

	Males	Females	Totals
Single	138	142	280
Total	138	142	280

TABLE 3.—Age of Patients Admitted

YEARS	Males	Females	Totals	Percentage
Under 1 year	2	2	4	1.43
1 to 6	32	32	64	22.86
7 to 13	86	74	160	57.14
14 to 18	18	34	52	18.57
Over 18	—	—	—	—
Total	138	142	280	100.00

Average age of patients, 9.08 years.

TABLE 4.—Nativity and Parentage of Patients Admitted

PLACE OF NATIVITY	MALES			FEMALES			TOTAL		
	Patient	Father	Mother	Patient	Father	Mother	Patient	Father	Mother
United States:									
Massachusetts	120	51	55	123	58	67	243	109	122
Other N. E. States	7	8	5	6	5	7	13	13	12
Other States	4	5	5	5	10	8	9	15	13
	131	64	65	134	73	82	265	137	147
Other Countries:									
Armenia	0	0	0	0	1	1	0	1	1
Austria	0	1	1	0	1	2	0	2	3
Azores	0	1	1	0	1	1	0	2	2
Canada	4	19	16	4	11	12	8	30	28
Cape Verde	0	1	1	0	1	1	0	2	2
China	0	0	1	0	0	0	0	0	1
England	0	1	2	0	2	2	0	3	4
France	0	0	1	0	0	0	0	0	1
Greece	0	8	7	0	2	0	0	10	7
Ireland	0	7	7	0	12	11	0	19	18
Italy	1	14	14	1	22	18	2	36	32
Jamaica	0	0	0	0	1	0	0	1	0
Latvia	0	2	1	0	0	0	0	2	1
Lithuania	0	1	2	0	2	1	0	3	3
Madeira	0	1	1	0	0	0	0	1	1
Newfoundland	1	2	2	1	1	1	2	3	3
Poland	0	4	4	0	2	2	0	6	6
Portugal	0	1	2	0	1	1	0	2	3
Russia	0	3	3	1	2	3	1	5	6
Scotland	0	0	0	0	1	1	0	1	1
Sicily	0	4	3	0	0	0	0	4	3
Spain	0	0	0	0	1	0	0	1	0
Sweden	0	1	1	0	0	0	0	1	1
Syria	0	0	0	0	1	1	0	1	1
West Indies	0	0	0	1	1	1	1	1	1
Unknown	1	3	3	0	3	1	1	6	4
Total Foreign	7	74	73	8	69	60	15	143	144
Grand Total	138	138	138	142	142	142	280	280	280

TABLE 5.—Residence of Patients Admitted

Amesbury	2	Franklin	1	Methuen	4	Salem	4
Andover	1	Gloucester	2	Natick	3	Somerville	5
Arlington	2	Haverhill	12	Newburyport	5	Taunton	2
Belmont	2	Hudson	2	Newton	3	Topsfield	1
Beverly	4	Ipswich	1	North Reading	2	Waltham	1
Boston	88	Lawrence	8	North Wilmington	1	Watertown	4
Brockton	4	Lowell	6	Norwood	1	Weymouth	1
Brookline	2	Lynn	9	Peabody	1	Winthrop	1
Cambridge	26	Malden	9	Plymouth	1	Worcester	1
Chelsea	3	Maynard	2	Quincy	36		
Cohasset	1	Medford	5	Reading	3	Total	280
Everett	5	Melrose	2	Revere	1		



TABLE 6.—*Occupation of Patients Admitted*

	Males	Females	Total
Student . . . . .	113	117	230
Preschool children . . . . .	25	23	48
Factory worker . . . . .	0	2	2
Total . . . . .	138	142	280

TABLE 7.—*Stage of Disease on Admission*

	Males	Females	Total	Percentage
Childhood tuberculosis . . . . .	97	95	192	68.57
Minimal . . . . .	3	11	14	5.00
Moderately advanced . . . . .	9	10	19	6.79
Advanced . . . . .	6	5	11	3.93
Tuberculosis of meninges . . . . .	1	0	1	.36
Tuberculosis of pleura . . . . .	1	0	1	.36
Chronic cardiac valvular disease . . . . .	1	0	1	.36
Malnutrition . . . . .	3	6	9	3.21
No disease . . . . .	5	8	13	4.64
Empyema . . . . .	1	1	2	.71
Lung abscess . . . . .	1	0	1	.36
Hyperthrophied tonsils . . . . .	0	1	1	.36
Pleurisy with effusion . . . . .	2	0	2	.71
Unclassified . . . . .	2	2	4	1.42
Deferred . . . . .	6	3	9	3.22
Total . . . . .	138	142	280	100.00

TABLE 8.—*Condition on Discharge*

	Males	Females	Total	Percentage
Apparently well . . . . .	11	20	31	12.21
Arrested . . . . .	51	18	69	27.17
Apparently arrested . . . . .	26	59	85	33.46
Quiescent . . . . .	4	9	13	5.11
Improved . . . . .	11	7	18	7.09
Unimproved . . . . .	7	11	18	7.09
Died . . . . .	6	5	11	4.33
Not considered . . . . .	4	5	9	3.54
Total . . . . .	120	134	254	100.00

TABLE 9.—*Deaths*

DURATION OF DISEASE	Males	Females	Totals	LENGTH OF RESIDENCE AT SANATORIUM		
				Males	Females	Totals
Under 1 month . . . . .	2	0	2	3	0	3
1 to 2 months . . . . .	0	0	0	1	2	3
2 to 3 months . . . . .	0	0	0	0	0	0
3 to 4 months . . . . .	1	0	1	0	0	0
4 to 5 months . . . . .	1	1	2	0	0	0
5 to 6 months . . . . .	0	0	0	0	0	0
6 to 7 months . . . . .	0	0	0	0	0	0
7 to 8 months . . . . .	0	0	0	2	1	3
8 to 9 months . . . . .	1	0	1	0	0	0
9 to 10 months . . . . .	0	0	0	0	0	0
10 to 11 months . . . . .	0	0	0	0	0	0
11 to 12 months . . . . .	0	1	1	0	0	0
12 to 13 months . . . . .	0	0	0	0	0	0
13 to 14 months . . . . .	0	0	0	0	0	0
15 to 16 months . . . . .	1	1	2	0	0	0
17 to 18 months . . . . .	1	1	2	0	0	0
Over 2 years . . . . .	0	2	2	0	1	1
Total . . . . .	6	5	11	6	5	11

TABLE 10.—*Causes of Death*

	Males	Females	Total
Tuberculosis of lungs . . . . .	4	5	9
Tuberculosis of meninges . . . . .	1	0	1
Tuberculosis of lungs and meninges . . . . .	1	0	1
Total . . . . .	6	5	11

## RUTLAND STATE SANATORIUM

## RESIDENT OFFICERS

ERNEST B. EMERSON, M.D., *Superintendent*.  
 PAUL DUFAULT, M.D., *Assistant Superintendent*.  
 ARMAND LAROCHE, M.D., *Senior Physician*.  
 GABRIEL NADEAU, M.D., *Senior Physician*.  
 CHARLES K. MCCARTHY, M.D., *Assistant Physician*.  
 ISRAEL KAHALAS, M.D., *Assistant Physician*.  
 RUBY DELPHINE MCCARTHY, M.D., *Assistant Physician*.  
 DELYA E. NARDI, R.N., *Principal of the School of Nursing*.  
 RENA BLANCHE NAUSS, R.N., *Assistant Principal of the School of Nursing*.  
 MARJORIE D. HESELTON, *Dietitian*.  
 OLIN C. BLAISDELL, *Steward*.  
 MARY A. BOYLE, *Treasurer*.  
 HARRY U. WENDELL, *Chief Power Plant Engineer*.  
 JOSEPH A. CARROLL, *Head Farmer*.  
 CORA A. PHILLIPS, *Head Housekeeper*.

## NON-RESIDENT OFFICERS

FRANK H. WASHBURN, M.D., *Senior Physician*.  
 EDWARD D. CHURCHILL, M.D., *Senior Physician*.  
 G. ARNOLD RICE, M.D., *Senior Physician*.  
 WILLIAM J. O'CONNOR, D.M.D., *Dentist*.

## Report of the Superintendent

TO DR. GEORGE H. BIGELOW, *Commissioner, Department of Public Health*:

I have the honor to submit the thirty-fifth annual report of the Rutland State Sanatorium for the year ending November 30, 1931.

During the year there has been expended \$325,280.63 for maintenance, a gross weekly per capita cost of \$17.29. There has been expended from Special Appropriation authorized by Chapter 146, Acts 1929, Water Supply and Sprinkler Heads, \$6,477.41; from Special Appropriations authorized by Chapter 115, Acts 1930, Hay Barn, Garage and Equipment, \$448.67, Medical and Surgical Building, \$29,836.67, Lightning Protection, \$5,000.86; from Special Appropriations authorized by Chapter 268, Acts 1931, Cow Barn, \$21,504.24; Chapter 245, Acts 1931, Electrical Equipment, \$849.25.

There has been collected from miscellaneous sources (the total of all collections) \$259,253.67, an increase of 9.32 per cent over the collections of last year. Deducting this amount from the gross maintenance expense leaves a net expense of \$66,026.96, a net weekly per capita cost of \$3.51. There has been collected from private sources \$12,483; from cities and towns \$44,387; from Worcester County \$40,565; from Middlesex County \$134,002.88; from the Tuberculosis Hospital District of Chelsea, Revere and Winthrop \$25,297.50; from State Minor Wards \$256; from the Attorney General \$225.

Thirty-five cases were supported wholly or in part from private funds; 46 cases by cities and towns; 15 wholly by the State; 155 by Middlesex County; 43 by Worcester County; 24 by the Tuberculosis Hospital District of Chelsea, Revere and Winthrop, and 1 by the Department of Public Welfare, Division of Child Guardianship. There were 43 cases on which settlement had not been determined.

There were 362 patients in the sanatorium at the beginning of the year and 305 at the close. The largest number present at one time was 371 and the smallest 305. The daily average number of patients was 361.70, a decrease of 1.77 over last year. There were 289 patients admitted during the year, 12 more than last year: 31 minimal, 122 moderately advanced, 119 far advanced, 10 unclassified, 2 childhood type, 1 tuberculous pleurisy, 2 tuberculous empyema, 1 bronchiectasis, and 1 gastric or duodenal ulcer. There were 173 admitted from cities and towns of over 25,000 population and 116 from cities and towns under 25,000 population. The average age of patients admitted was 29.98, a decrease of 1.41. Including deaths, there were 346 patients discharged, 74 more than last year. The average duration of residence was 561 days, which is 169 more than last year. Of those discharged,

219 gained 2,476.50 pounds, an average gain of 11.30 pounds per person. Of the discharged, there were 8 arrested cases, 6 more than last year; 6 apparently arrested cases, 6 less than last year; 153 quiescent cases, 44 more than last year; 63 improved, 53 unimproved, 15 not considered, the duration of treatment being less than one month. There were 5 discharged non-tuberculous. There were 43 deaths, 13 less than last year and the smallest number since 1919. There were 132,021 days of treatment, 648 days less than last year.

The following table shows the classification on the application blanks and our classification on admission:

	CLASSIFICATION ON APPLICATION BLANKS		OUR CLASSIFICATION ON ADMISSION		PER CENT	
	1930	1931	1930	1931	1930	1931
Minimal . . . . .	57	59	42	31	15.16	10.73
Moderately advanced . . . .	158	149	88	122	31.77	42.22
Far advanced . . . . .	41	51	134	119	48.37	41.17
Unclassified . . . . .	20	28	4	10	1.45	3.46
Childhood type . . . . .	1	2	2	2	.72	.70
Lung abscess . . . . .	—	—	2	—	.72	—
Tuberculous pleurisy . . . .	—	—	3	1	1.09	.34
Chronic bronchiectasis . . .	—	—	2	1	.72	.34
Tuberculous empyema . . .	—	—	—	2	—	.70
Gastric or duodenal ulcer . .	—	—	—	1	—	.34
	277	289	277	289	—	—

#### LABORATORY

Urine examinations — Routine, 532; 24 hour amount, 20; qualitative sugar determination and specific gravity, 1,014; qualitative sugar determination and specific gravity 24 hour amount, 184; quantitative sugar determinations, 59; acetone and diacetic acid tests, 858; benzidin test for occult blood, 4.

Sputum examinations for the tubercle bacilli — Positive, 2,564; no tubercle bacilli found, 3,454; total, 6,018.

Blood examinations — Cultures, 1; red cell counts, 618; white cell counts, 868; differential counts, 549; hemoglobin determinations (Tallquist), 531; hemoglobin determinations (Newcomer), 88; platelet count, 1; coagulation time, 6; bleeding time, 1; sugar determinations (Folin's method), 94; calcium determinations (Kramer and Tisdall), 16; urea nitrogen, 5; erythrocyte sedimentation tests, 1,053; Widal reactions, 138; malarial parasites, 2; icterus index, 1; Van Den Bergh reaction, 1.

Feces examinations — benzidin test for occult blood, 22.

Stomach contents—benzidine test for occult blood, 1.

Pleural fluid examinations — cultures, 12; smears, 12.

Spinal fluid examinations — chemical, 3; cell count, 2.

Differentiation of bacteria — by cultures, 22; by smears, 39.

Guinea pig inoculations and autopsies, 35.

Preparation of autogenous vaccines, 7.

Examination of pus from bronchi—by cultures, 5; by smears, 13; total, 18.

Cultures for tubercle bacilli (Corper Method), 7.

Examination of milk — bacteria counts, 104; percentage of fat, 52.

Microscopic examination of pork for *Trichinella Spiralis*, 26.

Phenol coefficient of Wescol determination, 1.

Cultures for further examination for *B typhosus* — from urine, 48; from feces, 48.

Blood drawn for Wassermann test — negative, 219; positive, 3; doubtful, 4; total, 226.

Spinal fluid drawn for Wassermann test, 4.

Spinal fluid drawn for Gold Sol test, 3; total number of examinations, 13,354.

Lectures in bacteriology to nurses' training school, 24.

Of the total number of patients (305) in the Sanatorium Nov. 30, 1931, 75.8 per cent had a positive sputum; in 21 per cent the tubercle bacilli were not found, and 3.2 per cent reported no sputum. Of the total number of patients whose sputum was examined during the year 78.3 per cent were positive.

There were 217 smallpox vaccinations and 216 typhoid and paratyphoid A. and B. inoculations.

There were 1,581 X-ray plates of chest, and 171 dental X-rays. Total 1,752.



## CLINICS

The following tables indicate the work of the consultation service, clinics, out-patient and others:

*Consultation Clinics.*—Number of patients examined at the Gardner, Milford, Framingham and Clinton clinics, 359.

*Diagnosis.*—Tuberculosis, 72; non-tuberculous, 107; observation, 148; childhood type, 30; tuberculous peritonitis, 1; tuberculous adenitis, 1.

Consultation cases to the number of 359 (169 more than last year) reported for 398 examinations (184 more than last year), and 14 ex-patients (23 less than last year) reported for 16 follow-up examinations (55 less than last year), making a total of 414 examinations (129 more than last year) at the consultation clinics.

Number of patients examined once, 325; number of patients examined twice, 26; number of patients examined three times, 7; number of patients examined four times, 1. Number of ex-patients examined once, 12; number of ex-patients examined twice, 2.

Number of physicians referring patients 84 (17 more than last year).

There were 5 patients admitted to the Sanatorium following examinations at the consultation clinics.

*Sanatorium—Out-Patient Clinic.*—Patients referred by physicians, 150; patients examined at own request, 72. Total, 222. Ex-patients examined at own request, 111. Grand total, 333.

*Diagnosis.*—Tuberculosis, 61; non-tuberculous, 75; observation, 63; childhood type, 13; tuberculous pleurisy, 3. Total, 215.

Two hundred and fifteen patients (11 more than last year) reported for 232 examinations (14 more than last year) and 119 ex-patients (24 less than last year) reported for 150 examinations (40 less than last year), making a total of 382 examinations at the sanatorium.

Number of patients examined once, 196; twice, 18; three times, 1. Number of ex-patients examined once, 97; twice, 15; three times, 5; four times, 2.

Number of physicians referring patients to the sanatorium 101 (6 more than last year).

The following figures indicate the work of the school clinics which were held in Orange and Dudley.

*Diagnosis.*—Tuberculosis, 10; non-tuberculous, 52; observation, 22; childhood type, 2; positive cases—re-examined, 4. Total, 90.

The total of all examinations made during the year exclusive of routine work was 886.

## DENTAL REPORT

The following is a summary of the dental work done during the year:

Office visits . . . . .	2,288	Extractions under novocaine . . . . .	308
New patients . . . . .	314	Gum treatments . . . . .	116
Pyorrhoea cases . . . . .	38	Treatments . . . . .	979
Stomatitis cases . . . . .	12	Post-extractions . . . . .	308
Gingivitis cases . . . . .	51	Impressions . . . . .	52
Vincent's cases . . . . .	44	Plates repaired . . . . .	17
Bridges fitted . . . . .	4	Mouth washes . . . . .	165
Plates trimmed . . . . .	19	Gold inlays . . . . .	16
Plates fitted . . . . .	10	Abscesses treated . . . . .	16
Bed cases . . . . .	34	Bridges cemented . . . . .	4
Bites for plates . . . . .	21	Process removed from upper right	
Hemorrhage checked . . . . .	12	molar region . . . . .	2
Surgical removals . . . . .	2	Upper partial plate readjusted . . . . .	13
Gums lanced . . . . .	22	Clasps on upper partial plates . . . . .	5
Restorations . . . . .	33	Scaling teeth . . . . .	51
Sockets curetted . . . . .	14	Crowns . . . . .	8
Ankylosis cases . . . . .	4	Clasp on upper partial plate re-	
Trismus cases . . . . .	2	paired . . . . .	1
Prophylaxis treatments . . . . .	103	Impacted teeth treatments . . . . .	8
Fillings . . . . .	503	Cysts lanced . . . . .	3

Extractions in bed . . . . .	23	Tuberculous tongue (treatment)	1
Impacted teeth extracted . . . . .	13	Tuberculous ulcers in cheek	
Irrigations . . . . .	36	(treatment) . . . . .	1
Exostosis . . . . .	2	Tuberculous ulcers on soft palate	1
Bone dissection . . . . .	1	Emergency cases . . . . .	3
Gutta Percha fillings . . . . .	55	Cement fillings . . . . .	30
Bridge removals . . . . .	6	Porcelain fillings . . . . .	28
Gangrene stomatitis . . . . .	1	Silver fillings . . . . .	390
Vulcanite stomatitis . . . . .	5		

### MEDICAL REPORT

The work and organization of the Sanatorium have been commended, and full approval awarded by the American College of Surgeons.

The following surgical work has been done either at the Massachusetts General Hospital, the Holden District Hospital, or at the Sanatorium:

Thoracoplasties, 18; phrenicectomies, 13; appendectomies, 15; lobectomies, 2; tonsillectomies, 10; bronchoscopies, 85; hemorrhoidectomies, 2; incision of abscess, 1; removal of sinus, 1; submaxillary adenectomy, 1; dilatation and curettage, 2; amputation of arm, 1. Total, 151.

One hundred and seventy-eight patients have been treated by artificial pneumothorax.

### PUBLICATIONS

The following papers were published or read during the year:

"Serum-Calcium in Pulmonary Tuberculosis." Dr. Jacob Kaminsky and Doris L. Davidson, A.B. Read at the Trudeau Society of Boston. *The American Review of Tuberculosis*.

"The Effect of Viosterol on Calcification in Pulmonary Tuberculosis." Dr. Jacob Kaminsky and Doris L. Davidson, A.B. *The American Review of Tuberculosis*.

"A Note on Simultaneous Bilateral Artificial Pneumothorax." Dr. Jacob Kaminsky. *The American Review of Tuberculosis*.

"Observations on the Erythrocyte Sedimentation in Pulmonary Tuberculosis." Dr. Jacob Kaminsky and Doris L. Davidson, A.B. Read at the fall meeting of the Eastern Section, American Sanatorium Association.

"Cod Liver Oil and Tomato Juice in Intestinal Tuberculosis." Dr. Armand Laroche. *L'Union Medicale du Canada*.

"Bilateral Pneumothorax." Dr. Armand Laroche. Read before the Trudeau Society of Boston.

"Oleothonax." Dr. Paul Dufault. Read before the Trudeau Society of Boston. *The American Review of Tuberculosis*.

"Kymographic Tracings in Artificial Pneumothorax." Dr. Paul Dufault. *The American Review of Tuberculosis*.

"Basal Pulmonary Lesions." Dr. Paul Dufault. Read before the Trudeau Society of Boston.

### RESIGNATIONS AND APPOINTMENTS

Dr. Jacob Kaminsky, Senior Physician, resigned Sept. 14, 1931, to accept a position on the staff of the Middlesex County Sanatorium.

Dr. J. Philippe Paquette, Assistant Physician, resigned Oct. 1, 1931, to specialize in tuberculosis in Montreal, Canada.

Doctor Kaminsky and Doctor Paquette rendered loyal and conscientious service; their resignations are a loss to the Sanatorium, and a break in whatever medical progress there may be.

Dr. Gabriel Nadeau has been promoted from Assistant Physician to Senior Physician.

Dr. Israel Kahalas, a graduate of Tufts Medical School, and of the Monmouth Memorial Hospital, was appointed Assistant Physician Sept. 21, 1931.

Dr. R. Delphine McCarthy, a graduate of Tufts Medical School, was appointed Assistant Physician Oct. 5, 1931.

## MEETINGS

The opening exercises of the Medical and Surgical Building were held Friday, June 26, 1931, with the following program:

Opening address, DeWitt C. DeWolfe, representing Governor Joseph B. Ely.

"The Sanatorium and the Home in the Treatment of Tuberculosis." Dr. Joseph H. Pratt, Physician and Chief, Medical Department, Boston Dispensary.

"The Development of Treatment at Rutland." Dr. Frank H. Washburn, Chief of Staff, Holden District Hospital.

"Surgery in Pulmonary Tuberculosis." Dr. Edward D. Churchill. Massachusetts General Hospital.

"The Part of Rutland in the Tuberculosis Campaign." Dr. Ernest B. Emerson, Superintendent, Rutland State Sanatorium.

Over four hundred physicians and tuberculosis workers attended the exercises, after which a buffet lunch was served in the main dining room.

Meetings of the Worcester District Medical Society, the Trudeau Society of Boston, and a joint meeting of the Wachusett Medical Improvement Society and the North Brookfield Medical Club were held at the Sanatorium during the year.

## TRAINING SCHOOL FOR NURSES

Lectures and demonstrations have been given by the Medical Staff.

Special instruction has been given by Dr. G. Arnold Rice in Laryngology. Dr. Luise Diez in Hygiene, Dr. Nels A. Nelson in Social Diseases and Mrs. Helen Hackett in Public Health Nursing.

The Hospital affiliations are:

Obstetrics and surgery, Cooley Dickinson Hospital, 8 months.

Medicine and genitourinary, Worcester City Hospital, 3 months.

Pediatrics and infant feeding, North Reading State Sanatorium, 2 months.

The following were awarded diplomas at the graduation exercises Sept. 28, 1931:

Wanda Janina Bielechi	Annette Veronica Houle
Josephine Julia Burba	Viola Delphi MacIsaac
Catherine Veronica Burke	Laura Toombs Moore
Mary Jane Gonas	Ruth Matilda Nielson
Mary Hally	Mary Simonds O'Connell
Eleanor Ernestine Hardy	Gouldie Bertha Sahlin
Mary Elizabeth Hines	Veronica Magdalene Tagman

Margaret Whitney Valley

There are 48 student nurses: 17 seniors, 15 intermediates and 16 juniors.

## IMPROVEMENTS AND RECOMMENDATIONS

The hay barn and garage, and lightning protection, authorized under Chapter 115, Acts of 1930, and the cow barn, Chapter 268, Acts of 1931, have been completed.

Work has been started on electrical equipment authorized under Chapter 245, Acts of 1931.

Radio is no longer a luxury for the hospital patient but an essential therapeutic measure particularly for those confined to the bed over prolonged periods of months, or even years.

At the present time the radio at the Sanatorium consists of battery sets in each ward, purchased for the most part by funds raised by the patients. This equipment is now obsolete, expensive to operate, and does not meet the requirements of a well-equipped hospital.

I am including in the budget the sum of \$3,500 for the installation of radio equipment throughout the wards, and including broadcasting facilities from the Assembly Hall, in order that bed patients may have the benefit of church services, lectures and entertainments.

The officers' dining room is very much overcrowded and I recommend \$1,800 to be included in the budget for an enlargement of this room.

I recommend an appropriation of \$7,500 for the purchase of X-ray and other equipment for use in the Medical and Surgical Building.



In order to complete the fire protection, I recommend an appropriation of \$4,725 for a six-inch pipe line to the farm buildings with hydrants and necessary meters.

## ACKNOWLEDGMENTS

The Reverend Father Smith, the Reverend Father McNamara, the Reverend Robert French and Rabbi Zeldner have brought spiritual consolation to all, surely of no less value in the treatment and care of patients than rest and sunshine for the bodily needs.

The medical staff, nurses and employees have loyally contributed to the work of the year.

Again, I deeply appreciate your counsel and confidence.

Respectfully,

ERNEST B. EMERSON,

*Superintendent.*

## POPULATION

	Males	Females	Totals
Number received during the year	159	130	289
Number passing out of the institution during the year	180	166	346
Number at end of the fiscal year in the institution	162	143	305
Daily average attendance (number of inmates actually present during the year)	185.37	176.33	361.70
Average number of employees and officers during the year	125.43	78.27	203.70

## Financial Report, Rutland State Sanatorium, 1931

*To the Department of Public Health:*

I respectfully submit the following report of the finances of this Institution for the fiscal year ending November 30, 1931.

## STATEMENT OF EARNINGS

Board of patients:			
Chelsea, Revere and Winthrop	\$25,740	05	
State Minor Wards	305	00	
Private	13,248	50	
Cities and towns	54,418	50	
Middlesex County	141,767	80	
Worcester County	42,045	00	
			\$277,524 85
Personal services:			
Reimbursement from Board of Retirement			166 60
Sales:			
Travel, transportation and office expenses	\$3	84	
Food	244	70	
Medical and general care	204	50	
Farm	482	71	
Garage, stable and grounds	157	76	
Repairs, ordinary	8	25	
Total sales	\$1,101	76	
Miscellaneous:			
Interest on bank balances	\$326	52	
Sanatorium Patients' Fund	440	27	
Total miscellaneous			\$766 79
Total earnings for the year			\$279,560 00
Total cash receipts reverting and transferred to the State Treasurer			259,253 67
Accounts Receivable outstanding Dec. 1, 1930	\$159,804	41	
Accounts Receivable outstanding Nov. 30, 1931	180,110	74	
Accounts Receivable increased			\$20,306 33

## MAINTENANCE APPROPRIATION

Balance from previous year, brought forward			\$11,280 07
Appropriation, current year	\$336,600	00	
Additional appropriation	2,400	00	
Total			\$350,280 07
Expenditures as follows:			
Personal services	\$177,551	77	
Food	58,607	41	
Medical and general care	13,151	52	
Farm	11,131	87	
Heat, light and power	26,384	63	

Garage, stable and grounds	3,458 31	
Travel, transportation and office expenses	3,765 43	
Religious instruction	1,950 00	
Clothing and materials	255 39	
Furnishings and household supplies	12,297 84	
Repairs, ordinary	6,632 39	
Repairs and renewals	10,094 07	
Total Maintenance Expenditures		\$325,280 63
Balance of Maintenance Appropriation, Nov. 30, 1931		24,999 44
Estimated Outstanding Liabilities, Nov. 30, 1931		\$9,030 59

## SPECIAL APPROPRIATIONS

Balance December 1, 1930, brought forward		\$44,275 10
Appropriations for current year		32,000 00
Total		\$76,275 10
Expended during the year (see statement below)	\$64,122 76	
Reverting to Treasury of Commonwealth	* 182 76	
(Star balances below that are reverting)		64,305 52
Balance November 30, 1931, carried to next year		\$11,969 58

APPROPRIATION	Act or Resolve	Total Amount Ap- propriated	Expended during Fiscal Year	Total Expended to Date	Balance at End of Year
Water Supply and Sprinkler Heads	146-1929	\$15,000 00	\$6,477 41	\$14,817 24	\$182 76*
Hay Barn, Garage and Equipment	115-1930	22,000 00	488 67	21,723 52	276 48
Medical and Surgical Building	115-1930	35,000 00	29,836 67	33,933 59	1,066 41
Lightning Protection	115-1930	6,000 00	5,000 86	5,014 16	985 84
Cow Barn	268-1931	25,000 00	21,509 90	21,509 90	3,490 10
Electrical Equipment	245-1931	7,000 00	849 25	849 25	6,150 75
Totals		\$110,000 00	\$64,122 76	\$97,847 66	\$12,152 34

## PER CAPITA

During the year the average number of patients has been	361.7
Total cost of maintenance	\$325,280 63
Equal to a weekly per capita cost of (52 weeks to year)	17 29
Total receipts for the year	259,253 67
Equal to a weekly per capita of	13 78
Total net cost of maintenance for year (total maintenance less total receipts)	66,026 96
Net weekly per capita	3 51

Respectfully submitted,

MARY A. BOYLE,

Treasurer.

## Inventory: Rutland State Sanatorium

## GRAND SUMMARY SHEET

November 30, 1931

## REAL ESTATE

Land (364.727 acres)	\$54,574 71
Buildings	756,553 43
Betterments (additions and improvements)	64,117 10
Total	\$875,245 24

## PERSONAL PROPERTY UNDISTRIBUTED SUPPLIES

Travel, transportation and office expenses	\$343 66
Food	5,607 55
Clothing and materials	719 16
Furnishings and household supplies	2,363 75
Medical and general care	2,481 77
Heat, light and power	13,931 81
Farm	3,967 21
Garage, stable and grounds	80 19
Repairs	4,659 34
Total	\$34,154 44

## PERSONAL PROPERTY DISTRIBUTED SUPPLIES

Travel, transportation and office expenses . . . . .	\$1,485 51
Clothing and materials . . . . .	182 64
Furnishings and household supplies . . . . .	35,596 12
Medical and general care . . . . .	8,579 36
Heat, light and power . . . . .	
Farm . . . . .	38,086 90
Garage, stable and grounds . . . . .	1,849 20
Repairs . . . . .	1,254 91
Total . . . . .	\$87,034 64

## GRAND SUMMARY

Real Estate — Total . . . . .	\$875,245 24
Personal Property — Undistributed Supplies, Total . . . . .	34,154 44
Personal Property — Distributed Supplies, Total . . . . .	87,034 64
Grand Total . . . . .	\$996,434 32

## Statistical Tables

TABLE I.—Admissions and Discharges

	Males	Females	Total
Patients in Sanatorium Nov. 30, 1930 . . . . .	183	179	362
Patients admitted Dec. 1, 1930, to Nov. 30, 1931, inclusive . . . . .	159	130	289
Patients discharged Dec. 1, 1930, to Nov. 30, 1931, inclusive . . . . .	180	166	346
Patients remaining in Sanatorium Nov. 30, 1931 . . . . .	162	143	305
Daily average number of patients . . . . .	185.37	176.33	361.70
Deaths (included in number discharged) . . . . .	21	22	43

TABLE 2.—Civil Condition of Patients Admitted

	Males	Females	Total
Single . . . . .	96	78	174
Married . . . . .	55	45	100
Widowed . . . . .	6	4	10
Divorced . . . . .	2	3	5
	159	130	289

TABLE 3.—Age of Patients Admitted

	Males	Females	Total	Percentage
14 to 20 years . . . . .	11	16	27	9.34
20 to 30 years . . . . .	76	73	149	51.57
30 to 40 years . . . . .	37	26	63	21.79
40 to 50 years . . . . .	18	11	29	10.04
Over 50 years . . . . .	17	4	21	7.26
Average age . . . . .	31.91	27.46	29.98	
	159	130	289	

TABLE 4.—Nativity and Parentage of Patients Admitted

PLACES OF NATIVITY	MALES			FEMALES			TOTALS		
	Patients	Fathers	Mothers	Patients	Fathers	Mothers	Patients	Fathers	Mothers
United States:									
Massachusetts . . . . .	98	28	31	88	24	25	186	52	56
Other New England States . . . . .	13	7	8	7	4	5	20	11	13
Other States . . . . .	7	7	6	12	6	4	19	13	10
Total Native . . . . .	118	42	45	107	34	34	225	76	79
Other Countries (23)									
Total Foreign . . . . .	41	117	113	23	96	95	64	213	208
Unknown . . . . .	—	—	1	—	—	1	—	—	2
Grand Totals . . . . .	159	159	159	130	130	130	289	289	289



TABLE 5.—*Residence of Patients Admitted*

	No.		No.		No.		No.
Action . . . . .	1	Gardner . . . . .	8	Northbridge . . . . .	4	Wakefield . . . . .	2
Arlington . . . . .	4	Grafton . . . . .	1	Norwood . . . . .	1	Waltham . . . . .	6
Athol . . . . .	1	Holden . . . . .	1	Orange . . . . .	1	Watertown . . . . .	5
Attleboro . . . . .	1	Holliston . . . . .	1	Palmer . . . . .	2	Webster . . . . .	4
Belmont . . . . .	1	Holyoke . . . . .	6	Princeton . . . . .	1	Wellesley . . . . .	1
Blackstone . . . . .	2	Leominster . . . . .	8	Reading . . . . .	1	Westboro . . . . .	1
Boston . . . . .	46	Lowell . . . . .	5	Revere . . . . .	11	West Brookfield . . . . .	2
Boylston . . . . .	2	Ludlow . . . . .	1	Rutland . . . . .	2	Westfield . . . . .	4
Cambridge . . . . .	3	Malden . . . . .	15	Shrewsbury . . . . .	2	Westminster . . . . .	1
Charlton City . . . . .	1	Marlboro . . . . .	3	Somerville . . . . .	17	Weymouth . . . . .	1
Chelmsford . . . . .	1	Maynard . . . . .	2	Southbridge . . . . .	2	Wilmington . . . . .	1
Chelsea . . . . .	15	Medford . . . . .	4	Spencer . . . . .	1	Winchester . . . . .	1
Chicopee . . . . .	2	Medway . . . . .	1	Springfield . . . . .	21	Winthrop . . . . .	4
Clinton . . . . .	6	Melrose . . . . .	7	Stoneham . . . . .	2	Woburn . . . . .	2
Concord . . . . .	1	Milford . . . . .	8	Stoughton . . . . .	2	Worcester . . . . .	6
Dudley . . . . .	3	Millbury . . . . .	1	Sutton . . . . .	1		
Fall River . . . . .	3	Natick . . . . .	1	Townsend . . . . .	1		
Fitchburg . . . . .	2	Newburyport . . . . .	1	Tyngsboro . . . . .	1		
Framingham . . . . .	3	Newton . . . . .	2	Uxbridge . . . . .	1		
						Total . . . . .	289

TABLE 6.—*Occupation of Cases Admitted*

	Males	Females		Males	Females
Accountant . . . . .	3	—	Maid . . . . .	—	1
Advertiser (newspaper) . . . . .	1	—	Mail Sorter . . . . .	1	—
Agent (Employment) . . . . .	—	1	Mechanic (Auto) . . . . .	2	—
Agent (Insurance) . . . . .	3	—	Merchant . . . . .	1	—
Assistant (Carpenters) . . . . .	2	—	Messenger . . . . .	—	1
Assistant (Chemist's) . . . . .	1	—	Metal Polisher . . . . .	1	—
Assistant (Dental) . . . . .	—	1	Milliner . . . . .	—	2
Assistant (Laboratory) . . . . .	1	—	Moulder . . . . .	1	—
Assistant Manager . . . . .	1	—	No Occupation . . . . .	—	4
Attendant . . . . .	2	2	Nurse (Graduate) . . . . .	—	9
Barber . . . . .	1	—	Nurse (Practical) . . . . .	—	1
Bookkeeper . . . . .	1	5	Nurse (Student) . . . . .	—	2
Burler . . . . .	—	1	Operator (Street Car) . . . . .	1	—
Calker (Ship) . . . . .	1	—	Operator (Telephone) . . . . .	—	5
Carpenter . . . . .	5	—	Painter . . . . .	5	—
Chauffeur . . . . .	5	—	Photographer . . . . .	1	—
Clerk . . . . .	11	9	Physician . . . . .	1	—
Clerk (Railway Mail) . . . . .	1	—	Policeman . . . . .	1	—
Collector . . . . .	1	—	Printer . . . . .	5	1
Counterman . . . . .	1	—	Repairman . . . . .	4	—
Cook . . . . .	2	—	Repairer (Watch) . . . . .	1	—
Cutter (Fish) . . . . .	1	—	Rigger (Machine) . . . . .	1	—
Decorator . . . . .	1	—	Road Stand Worker . . . . .	1	—
Detective . . . . .	1	—	Roofer . . . . .	1	—
Draftsman . . . . .	2	—	Salesman . . . . .	8	—
Driver (Truck) . . . . .	3	—	Saleslady . . . . .	—	3
Electrician . . . . .	2	—	Secretary . . . . .	—	3
Errand Boy . . . . .	1	—	Sewer . . . . .	—	1
Factory . . . . .	23	18	Sheet Metal Worker . . . . .	1	—
Farmer . . . . .	1	—	Stenographer . . . . .	—	6
Fireman . . . . .	1	—	Stove Maker . . . . .	1	—
Forewoman . . . . .	—	1	Student . . . . .	11	5
Furrier . . . . .	1	—	Supervisor (Elevator) . . . . .	1	—
Garageman . . . . .	2	—	Supervisor (Office) . . . . .	1	—
General Work . . . . .	1	1	Tailor . . . . .	2	—
Grader (Wool) . . . . .	1	—	Teacher (School) . . . . .	—	2
Helper (Baker's) . . . . .	1	—	Teamster . . . . .	1	—
Helper (Plumber's) . . . . .	1	—	Teller . . . . .	1	—
Helper (Toolmaker's) . . . . .	1	—	Trimmer (Window) . . . . .	1	—
Housekeeper . . . . .	—	1	Waiter . . . . .	1	—
Housewife . . . . .	—	32	Waitress . . . . .	—	2
Housework . . . . .	—	7	Watchman . . . . .	1	—
Inspector (Moth) . . . . .	1	—	Weaver . . . . .	—	3
Laborer . . . . .	9	—	Wheelmaker . . . . .	1	—
Machinist . . . . .	2	—	Wireworker . . . . .	1	—
Males . . . . .	159				
Females . . . . .	130				
Total . . . . .	289				
Total number of occupations . . . . .	90				

TABLE 7.—*Stage of Disease on Admission*

	Males	Females	Totals	Percentage
Minimal . . . . .	15	16	31	10.73
Moderately advanced . . . . .	65	57	122	42.22
Far advanced . . . . .	71	48	119	41.17
Unclassified . . . . .	5	5	10	3.46
Childhood type . . . . .	1	1	2	.70
Tuberculous empyema . . . . .	—	2	2	.70
Tuberculous pleurisy . . . . .	1	—	1	.34
Bronchiectasis . . . . .	1	—	1	.34
Gastric or duodenal ulcer . . . . .	—	1	1	.34
	159	130	289	

TABLE 8.—*Condition on Discharge*

	Males	Females	Total	Percentage
Arrested . . . . .	4	4	8	2.31
Apparently arrested . . . . .	2	4	6	1.74
Quiescent . . . . .	83	70	153	44.22
Improved . . . . .	33	30	63	18.21
Unimproved . . . . .	25	28	53	15.32
Deaths . . . . .	21	22	43	12.42
Not considered . . . . .	10	5	15	4.34
Non-tuberculous . . . . .	2	3	5	1.44
	180	166	346	

TABLE 9.—*Deaths*

DURATION OF DISEASE	Males	Females	Totals	LENGTH OF RESIDENCE AT SANATORIUM		
				Males	Females	Totals
Under 1 month . . . . .	—	—	—	1	—	1
1 to 2 months . . . . .	—	—	—	1	1	2
2 to 3 months . . . . .	—	—	—	2	1	3
3 to 4 months . . . . .	—	—	—	2	—	2
4 to 5 months . . . . .	—	—	—	1	—	1
5 to 6 months . . . . .	1	—	1	—	—	—
6 to 7 months . . . . .	—	—	—	—	—	—
7 to 8 months . . . . .	—	—	—	—	2	2
8 to 9 months . . . . .	—	—	—	2	2	4
9 to 10 months . . . . .	—	—	—	—	1	1
10 to 12 months . . . . .	1	2	3	3	4	7
12 to 18 months . . . . .	1	3	4	5	4	9
18 to 24 months . . . . .	4	2	6	1	2	3
Over 2 years . . . . .	14	15	29	3	5	8
	21	22	43	21	22	43

TABLE 10.—*Cause of Death*

	Males	Females	Totals
Pulmonary tuberculosis . . . . .	18	21	39
Chronic bilateral bronchiectasis . . . . .	—	1	1
Cancer of lung . . . . .	1	—	1
Lung abscess . . . . .	1	—	1
Tuberculous meningitis . . . . .	1	—	1
	21	22	43

## WESTFIELD STATE SANATORIUM

## RESIDENT OFFICERS

ROY MORGAN, M.D., *Superintendent*.  
 HEMAN B. CHASE, M.D., *Assistant Superintendent*.  
 J. ERNEST LANDRY, M.D., *Senior Physician*.  
 BERNARD GOLDBLATT, M.D., *Assistant Physician*.  
 J. HOWARD HOWE, M.D., *Assistant Physician*.  
 GEORGE E. CROWELL, D.M.D., *Dentist*.  
 BESSIE MACDONALD, R.N., *Superintendent of Nurses and Matron*.  
 JOSEPHINE E. FRENCH, *Treasurer*.  
 JOHN E. KINSELLA, *Steward*.  
 BENJAMIN J. SANDIFORD, *Chief Power Plant Engineer*.  
 WILLIAM G. ATKINSON, *Head Farmer*.

## NON-RESIDENT OFFICERS

M. ARCHIBALD DECHTER, M.D., *Consultant in Diseases of the Eye, Ear, and Throat*.  
 DR. A. D. ROOD, *Consultant in Bronchoscopy*.

## Report of the Superintendent

TO DR. GEORGE H. BIGELOW, *Commissioner, Department of Public Health.*

I have the honor to submit the twenty-second annual report of the Westfield State Sanatorium for the year ending November 30, 1931.

We had 274 patients at the beginning of the year and 273 at the close. Our daily average was 274.92. The largest number present was 289—the smallest 258.

Total of cases admitted was 206. These were classified as shown in the following table:

No disease . . . . .	4	Moderately advanced . . . . .	14	Tuberculous peritonitis . . . . .	1
Malnutrition . . . . .	11	Advanced . . . . .	9	Unclassified . . . . .	1
Hilum tuberculosis . . . . .	132	Bronchiectasis . . . . .	2	Chronic pleuritis . . . . .	2
Minimal . . . . .	23	Pleurisy with effusion . . . . .	6	Cardiac disease . . . . .	1
					206

## POPULATION

	Males	Females	Totals
Number received during the year . . . . .	87	119	206
Number passing out of the Institution during the year . . . . .	109	98	207
Number at end of the fiscal year in the Institution . . . . .	122	151	273
Daily average attendance (number of inmates actually present during the year) . . . . .	133.76	141.16	274.92
Average number of employees and officers during the year . . . . .	89	50	139

One hundred and eleven (111) cases were admitted from cities and towns of over 25,000 population; 95 from cities and towns of less than 25,000. The average age of patients was 11.63 years. There were 207 discharges. The average length of stay of patients discharged, including deaths, was 455 days. Of these 13 were apparently well; 123 apparently arrested; 44 improved; 17 unimproved; 1 no disease; 1 was not considered as patient (stayed less than 30 days), and there were 8 deaths. Of those discharged, 188 gained 2,746.25 pounds—or an average of 14.6 pounds. There were 99,725 hospital days of treatment.

## MEDICAL WORK

As in the past, our medical work has been largely routine. In our cases of childhood tuberculosis, we rely on a well-ordered routine for results. In our cases of the adult type, we are depending mostly on prolonged bed treatment with the occasional use of pneumothorax. During the year we have started 19 cases on that treatment and at the end of the year we had 9 patients who were being treated by pneumothorax.

We have had a few scattered cases of mumps during the late summer and fall. Fortunately, we have had no other acute contagious diseases during the year.

Our out-patient work has increased somewhat. This work has been steadily growing as shown in the table below:

1924 . . . . .	241	1928 . . . . .	1077
1925 . . . . .	396	1929 . . . . .	1341
1926 . . . . .	441	1930 . . . . .	1518
1927 . . . . .	743	1931 . . . . .	1633

The great majority of these have been cases referred by the family physicians or by some legitimate organization.

We are also continuing pneumothorax treatment on 4 cases which were discharged from the Rutland State Sanatorium.

We have continued to work with the Hampden County Tuberculosis Association in the conducting of clinics in the smaller cities and towns. We have also furnished them with medical supervision for their summer camp. All children at the camp were given a tuberculin test and all the reactors were X-rayed. Those who showed a positive or suspicious X-ray were examined.

We have conducted 16 clinics in the county. In these clinics, 755 Von Pirquet tests were done, 600 X-rays were taken and 332 physical examinations made. In these clinics we found 13 cases of pulmonary tuberculosis and 54 cases of hilum tuberculosis.



## DENTAL REPORT

The following table shows the work done in the dental clinic during the year:

Prophylactic treatments, 679; fillings—permanent teeth, 982; fillings—temporary teeth, 487; extractions—permanent teeth, 146; extractions—temporary teeth, 284; treatments, 75; restorations, 9, X-ray, 27; Irrigations, 7; examinations for seven months, 551; surgical extractions, 5; surgical removal of mandibular cyst, 1; fixed restoration, 3; full-upper restoration, 1; full-lower restoration, 1; partial plate, restoration, 2. Total, 3,260.

Visits, 1,726; New patients, 161; Dismissals, 607.

## SANATORIUM SCHOOL

*Average Daily Attendance from December, 1930, to December, 1931*

Grade I . . . . .	19.40
Grade II . . . . .	14.80
Grade III . . . . .	21.28
Grade IV . . . . .	31.43
Grade V . . . . .	18.55
Grade VI . . . . .	17.42
Grade VII . . . . .	10.67
Grade VIII . . . . .	15.14
Manual Training . . . . .	17.70
Total average . . . . .	166.39
Total enrollment . . . . .	321.

## IMPROVEMENTS MADE DURING THE YEAR

The Superintendent's cottage was completed and was occupied in June. The Superintendent's old quarters have been remodeled for our X-ray Department. X-ray equipment has been purchased and will be installed within a few weeks. The porches of the children's ward have been glassed in, which makes that building much more suitable for the housing of small children. A new skating rink was built in the fall. Considerable work was done during the year for the improvement of our water and sewerage systems. The new employees' building was started in October. Work on it is progressing satisfactorily and it should be completed by March or April.

Under the emergency act of January, 1931, about twenty-five acres of woodland was cleared and part of it was placed under cultivation during the summer.

## RECOMMENDATIONS

We have no special recommendations. Our building program has been well taken care of during the past two years. We have no unusual needs at present, with the exception of a few minor "Repair and Renewal" items which have been included in our budget.

## PERSONNEL

Dr. J. Howard Howe was added to our staff on June 9, 1931. This was a new position. Dr. A. D. Rood of Springfield was also appointed on the consultant staff as bronchoscopist. There were no other important changes during the year.

## ACKNOWLEDGMENTS

I wish to thank our clergymen and the heads of the various departments for their loyalty and cooperation during the year. We also are thankful to our many friends for the furnishing of gifts and entertainments.

ROY MORGAN,  
*Superintendent.*

## Financial Report, Westfield State Sanatorium, 1931

TO THE DEPARTMENT OF PUBLIC HEALTH:

I respectfully submit the following report of the finances of this Institution for the fiscal year ending November 30, 1931.

### STATEMENT OF EARNINGS

Board of patients:		
Private	\$3,874 00	
Cities and towns	71,355 50	
		\$75,229 50
Personal services:		
Reimbursement from Board of Retirement	\$26 66	
Sales:		
Food	\$203 99	
Clothing and materials	1,000 97	
Furnishings and household supplies	6 00	
Medical and general care	199 25	
Farm	1,135 55	
Garage, stable and grounds	44 51	
Arts and crafts sales	174 85	
Miscellaneous — junk	22 00	
Total	\$2,787 12	
Total earnings for the year		\$78,043 28
Total cash receipts reverting and transferred to the State Treasurer		74,441 78
Accounts Receivable outstanding Dec. 1, 1930	\$18,912 07	
Accounts Receivable outstanding Nov. 30, 1931	22,513 57	
Accounts Receivable increased		\$3,601 50

### MAINTENANCE APPROPRIATION

Balance from previous year, brought forward		\$3,231 93
Appropriation, current year	\$265,490 00	
Total		\$268,721 93
Expenditures as follows:		
Personal services	\$148,201 16	
Food	33,474 76	
Medical and general care	8,132 65	
Farm	13,265 73	
Heat, light and power	13,887 86	
Garage, stable and grounds	5,096 69	
Travel, transportation and office expenses	3,110 89	
Religious instruction	1,214 00	
Clothing and materials	3,361 72	
Furnishings and household supplies	8,295 73	
Repairs, ordinary	7,600 72	
Repairs and renewals	5,709 44	
Total Maintenance Expenditures		\$251,351 35
Balance of Maintenance Appropriation, Nov. 30, 1931		\$17,370 58
Estimated Outstanding Liabilities, Nov. 30, 1931		5,129 64

### SPECIAL APPROPRIATIONS

Balance December 1, 1930, brought forward		\$26,917 56
Appropriations for current year		101,500 00
Total		\$128,417 56
Expended during year (see statement below)	\$55,202 66	
Balance November 30, 1931, carried to next year		\$73,214 90

APPROPRIATION	Year of Act or Resolve	Total Amount Appropriated	Expended during Fiscal Year	Total Expended to Date	Balance at end of Year
Water supply and fire protection	1930-1931	\$21,900 00	\$8,491 86	\$20,538 72	\$1,361 28
Farmhouse alterations	1930	9,000 00	59 58	8,612 15	387 85
Children's building alterations	1930	11,000 00	1,037 44	10,912 01	87 99
Administration building alterations	1930	3,800 00	3,154 14	3,154 14	645 86
Superintendent's residence	1930	21,000 00	16,361 64	20,670 08	329 92
Clearing land	1931	6,000 00	5,970 34	5,970 34	29 66
Dormitory for employees	1931	79,500 00	14,697 33	14,697 33	64,802 67
X-ray and other equipment	1931	6,000 00	463 48	463 48	5,536 52
Additional sewage disposal	1931	5,000 00	4,966 85	4,966 85	33 15
		\$163,200 00	\$55,202 66	\$89,985 10	\$73,214 90

## PER CAPITA

During the year the average number of patients has been . . . . .	274.92
Total cost of maintenance . . . . .	\$251,351 35
Equal to a weekly per capita cost of (52 weeks to year) . . . . .	17.5821
Total receipts for the year . . . . .	74,441 78
Equal to a weekly per capita of . . . . .	5.2073
Total net cost of maintenance for year (total maintenance less total receipts) . . . . .	\$176,909 57
Net weekly per capita . . . . .	12.3748

Respectfully submitted,  
 JOSEPHINE E. FRENCH,  
*Treasurer.*

## Inventory: Westfield State Sanatorium

## GRAND SUMMARY SHEET

November 30, 1931

## REAL ESTATE

Land, 263.6 acres . . . . .	\$16,540 00
Buildings . . . . .	372,234 29
Betterments (additions and improvements) . . . . .	27,819 25
	<hr/>
	\$416,593 54

## PERSONAL PROPERTY UNDISTRIBUTED SUPPLIES

Travel, transportation and office expenses . . . . .	\$150 00
Food . . . . .	3,493 18
Clothing and materials . . . . .	3,170 98
Furnishings and household supplies . . . . .	2,778 82
Medical and general care . . . . .	761 64
Heat, light and power . . . . .	3,832 10
Farm . . . . .	2,083 60
Garage, stable and grounds . . . . .	97 03
Repairs . . . . .	35 63
	<hr/>
	\$16,402 98

## PERSONAL PROPERTY DISTRIBUTED SUPPLIES

Travel, transportation and office expenses . . . . .	\$3,736 46
Clothing and materials . . . . .	757 61
Furnishings and household supplies . . . . .	31,768 69
Medical and general care . . . . .	39,827 53
Heat, light and power . . . . .	3,601 66
Farm . . . . .	33,050 51
Garage, stable and grounds . . . . .	8,700 94
Repairs . . . . .	2,612 19
	<hr/>
Total . . . . .	\$124,055 59

## GRAND SUMMARY

Real Estate — Total . . . . .	\$416,593 54
Personal Property — Undistributed Supplies, Total . . . . .	16,402 98
Personal Property — Distributed Supplies, Total . . . . .	124,055 59
	<hr/>
	\$557,052 11

## Statistical Tables

TABLE 1.—Admissions and Discharges

	Males	Females	Totals
Number of patients admitted December 1, 1930, to November 30, 1931, inclusive . . . . .	87	119	206
Number of patients discharged December 1, 1930, to November 30, 1931, inclusive . . . . .	109	98	207
Number of deaths (including those in previous items) . . . . .	5	3	8
Number in Sanatorium December 1, 1930 . . . . .	144	130	274
Number remaining November 30, 1931 . . . . .	122	151	273

TABLE 2.—Civil Condition of Patients Admitted

	Males	Females	Totals
Single . . . . .	87	119	206

TABLE 3.—Ages of Patients Admitted

	Males	Females	Totals
1 to 13 years . . . . .	54	74	128
14 to 20 years . . . . .	32	45	77
20 to 60 years . . . . .	1	0	1
	<hr/>	<hr/>	<hr/>
	87	119	206



TABLE 4.—*Places of Nativity*

PLACE OF NATIVITY	MALES			FEMALES			TOTALS		
	Patients	Fathers	Mothers	Patients	Fathers	Mothers	Patients	Fathers	Mothers
United States:									
Massachusetts . . . . .	74	34	34	106	41	44	180	75	78
Other New England States . . . .	7	8	8	6	10	9	13	18	17
Other States . . . . .	2	5	2	0	3	6	2	8	8
Total Natives . . . . .	83	47	44	112	54	59	195	101	103
Other Countries:									
Armenia . . . . .	0	1	1	1	1	1	1	2	2
Austria . . . . .	0	0	0	0	1	1	0	1	1
Australia . . . . .	0	0	0	0	1	0	0	1	0
Azores . . . . .	0	0	0	0	1	0	0	1	0
Canada . . . . .	3	7	10	5	19	16	8	26	26
Brazil . . . . .	0	0	0	0	0	1	0	0	1
England . . . . .	0	0	0	0	1	3	0	1	3
Finland . . . . .	0	1	1	0	1	1	0	2	2
Germany . . . . .	0	2	1	0	1	0	0	3	1
Greece . . . . .	1	1	1	0	0	0	1	1	1
Ireland . . . . .	0	2	2	0	4	3	0	6	5
Italy . . . . .	0	4	7	0	9	10	0	13	17
Lithuania . . . . .	0	0	0	0	1	1	0	1	1
Norway . . . . .	0	1	2	0	0	0	0	1	2
Poland . . . . .	0	9	9	0	11	11	0	20	20
Portugal . . . . .	0	3	3	0	3	2	0	6	5
Rumania . . . . .	0	1	0	0	0	0	0	1	0
Russia . . . . .	0	2	3	0	3	4	0	5	7
Scotland . . . . .	0	0	0	0	0	1	0	0	1
Spain . . . . .	0	1	1	0	1	1	0	2	2
South America . . . . .	0	1	1	0	0	0	0	1	1
Sweden . . . . .	0	1	1	0	2	2	0	3	3
Wales . . . . .	0	0	0	0	1	0	0	1	0
Unknown . . . . .	4	37	43	6	61	58	10	98	101
Total Foreign . . . . .	0	3	0	1	4	2	1	7	2
Grand Totals . . . . .	4	40	43	7	65	60	11	105	103
Grand Totals . . . . .	87	87	87	119	119	119	206	206	206

TABLE 5.—*Residence of Patients Admitted*

Arlington . . . . .	1	Fall River . . . . .	1	Marlboro . . . . .	1	Shirley . . . . .	1
Ashland . . . . .	1	Falmouth . . . . .	1	Milford . . . . .	9	Somerville . . . . .	1
Auburn . . . . .	2	Fitchburg . . . . .	17	Millbury . . . . .	1	Southbridge . . . . .	1
Belmont . . . . .	2	Foxboro . . . . .	2	Millville . . . . .	1	Springfield . . . . .	19
Berlin . . . . .	1	Framingham . . . . .	4	Montague . . . . .	1	Stockbridge . . . . .	1
Bernardston . . . . .	1	Franklin . . . . .	1	Needham . . . . .	1	Sutton . . . . .	1
Blackstone . . . . .	2	Grafton . . . . .	1	North Adams . . . . .	4	Taunton . . . . .	1
Boston . . . . .	23	Hatfield . . . . .	1	Northboro . . . . .	2	Waltham . . . . .	2
Brockton . . . . .	1	Holyoke . . . . .	11	North Hadley . . . . .	1	Wareham . . . . .	1
Cambridge . . . . .	1	Hudson . . . . .	8	Northampton . . . . .	2	Watertown . . . . .	2
Canton . . . . .	1	Lancaster . . . . .	1	Newburyport . . . . .	3	Webster . . . . .	1
Chelsea . . . . .	3	Lawrence . . . . .	1	Palmer . . . . .	4	Westfield . . . . .	2
Chicopee . . . . .	3	Lee . . . . .	2	Pittsfield . . . . .	15	Westford . . . . .	3
Dalton . . . . .	2	Leominster . . . . .	2	Quincy . . . . .	7	Worcester . . . . .	12
Easthampton . . . . .	2	Lowell . . . . .	1	Revere . . . . .	1		
East Douglas . . . . .	2	Ludlow . . . . .	1	Shrewsbury . . . . .	3	Total . . . . .	206

TABLE 6.—*Occupation of Cases Admitted*

At home . . . . .		Males	Females	Totals
Bell boy . . . . .		8	10	18
Factory . . . . .		1	0	1
Housework . . . . .		1	1	2
Laundress . . . . .		0	1	1
School . . . . .		0	1	1
Usher . . . . .		76	106	182
		1	0	1
		87	119	206

TABLE 7.—*Stage of Disease on Admission*

Cardiac disease . . . . .	Males	Females	Totals	Percentage
No disease . . . . .	0	1	1	.49
Malnutrition . . . . .	3	1	4	1.94
Hilum tuberculosis . . . . .	4	7	11	5.30
Minimal . . . . .	56	76	132	64.22
Moderately advanced . . . . .	10	13	23	11.11
Advanced . . . . .	4	10	14	6.75
Bronchiectasis . . . . .	2	7	9	4.36
Pleurisy with effusion . . . . .	2	0	2	.97
Unclassified . . . . .	3	3	6	2.91
Chronic pleuritis . . . . .	0	1	1	.49
Tuberculosis peritonitis . . . . .	2	0	2	.97
	1	0	1	.49
	87	119	206	100.00

TABLE 8.—Condition on Discharge

	Males	Females	Totals	Percentage
Apparently well . . . . .	5	8	13	6.28
Apparently arrested . . . . .	71	52	123	59.42
Improved . . . . .	18	26	44	21.26
Unimproved . . . . .	9	8	17	8.22
Not considered . . . . .	0	1	1	.48
Died . . . . .	5	3	8	3.86
No disease . . . . .	1	0	1	.48
	109	98	207	100.00

TABLE 9.—Deaths

DURATION OF DISEASE	Males	Females	Totals	LENGTH OF RESIDENCE AT SANATORIUM		
				Males	Females	Totals
3 to 4 months . . . . .	0	0	0	1	0	1
5 to 6 months . . . . .	1	0	1	0	2	2
6 to 7 months . . . . .	0	1	1	0	0	0
10 to 12 months . . . . .	0	1	1	0	0	0
12 to 13 months . . . . .	1	0	1	1	0	1
13 to 14 months . . . . .	0	0	0	1	0	1
14 to 16 months . . . . .	0	0	0	1	0	1
18 to 24 months . . . . .	2	0	2	1	0	1
Over 2 years . . . . .	1	1	2	0	1	1
	5	3	8	5	3	8

TABLE 10.—Cause of Death

	Males	Females	Totals
Pulmonary tuberculosis . . . . .	5	3	8

## PONDVILLE HOSPITAL

## RESIDENT OFFICERS

GEORGE M. SULLIVAN, M.D., *Superintendent.*  
 HOOSIG H. SERUNIAN, M. D., *Senior Physician.*  
 JOSEPH L. KENNEDY, M.D., *Assistant Physician.*  
 RICHARD W. MORRIS, M.D., *Assistant Physician.*  
 ROY E. MABREY, M.D., *Assistant Physician.*  
 SYLVAN H. ROBERTSON, M.D., *Pathologist.*  
 MARY A. ROGAN, R.N., *Principal of School of Nursing.*  
 MARION MACKENZIE, *Principal Bookkeeper and Treasurer.*  
 NEIL FOUNTAIN, *Head Social Service Worker.*  
 MARJORIE RITCHIE, *Laboratory Technician.*  
 ERNEST L. GAGE *Chief Power Plant Engineer.*  
 MAY E. DONOVAN, *Head Housekeeper.*  
 DANIEL DONOVAN, *Groundskeeper.*

## NON-RESIDENT OFFICERS

ERNEST M. DALAND, M.D., *Chief of Visiting Staff (Surgeon).*  
 GRANTLEY W. TAYLOR, M.D., *Senior Physician (Assistant Surgeon).*  
 HORATIO ROGERS, M.D., *Senior Physician (Assistant Surgeon).*  
 RICHARD DRESSER, M.D., *Senior Physician (Roentgenologist).*  
 CHARLES E. DUMAS, M.D., *Senior Physician (Assistant Roentgenologist).*  
 JOE VINCENT MEIGS, M.D., *Senior Physician (Gynecologist).*  
 LANGDON PARSONS, M.D., *Senior Physician (Assistant Gynecologist).*  
 ROGER C. GRAVES, M.D., *Senior Physician (Urologist).*  
 CARL H. ERNLUND, M.D., *Senior Physician (Laryngologist).*  
 HENRY JACKSON, JR., M.D., *Senior Physician (Internist).*  
 EUGENE C. GLOVER, M.D., *Senior Physician (Assistant Internist).*  
 JOHN S. HODGSON, M.D., *Senior Physician (Neurological Surgeon).*  
 ARTHUR M. GREENWOOD, M.D., *Senior Physician (Dermatologist).*  
 RICHARD H. NORTON, D.M.S., *Senior Physician (Oral Surgeon).*  
 SHIELDS WARREN, M.D., *Senior Physician (Pathologist).*  
 VALMORE A. PELLETIER, M.D., *Senior Physician (Assistant Surgeon Out-Patient Department).*  
 HARRY W. HARDING, D.M.D. (*Dentist*).  
 HUGO B. C. RIEMER, M.D. *Senior Physician (Ophthalmologist).*  
 JAMES C. HUDSON, M.S. (*Physicist*).

## Report of the Superintendent

TO DR. GEORGE H. BIGELOW, *Commissioner, Department of Public Health:*

I have the honor to submit the fifth annual report of the Pondville Hospital (Norfolk), P. O. Wrentham, Massachusetts, for the year ending November 30, 1931.

During the year, for maintenance there was expended \$230,112.53, representing a gross weekly per capita cost of \$38.86. There were collected from miscellaneous sources \$54,408.44 (total of all collections). Of this sum, \$20,034.85 came from private sources; \$33,668.89 came from cities and towns; \$55.59 came from the State Board of Retirement; \$163.33 electricity furnished Prison Colony; \$60.73 interest on bank account; and from sales \$425.05.

Deducting the above total collections from the maintenance expenses leaves a net expense of \$175,704.09, equivalent to a net weekly cost per capita of \$29.67.

Three hundred and ninety-three patients were supported by private funds, 313 by cities and towns, 60 by the State, leaving 63 settlements pending.

From special appropriations, funds have been expended as follows:

For Hospital Unit and Out-Patient Department, authorized by Acts of 1929, Chapter 146 and Acts of 1930, Chapter 115 (\$110,500), \$6,822.14.

For Automatic Sprinklers and Additional Fire Protection, authorized by Acts of 1928, Chapter 127, Acts of 1929, Chapter 146, and Acts of 1930, Chapter 115 (\$19,000) \$314.37.

For Recreation Building, authorized by Acts of 1930, Chapter 115 (\$6,000), \$3,732.50.

On November 30, 1930, 110 patients remained in the hospital. During the year there were 907 admissions. Of these 188 represented readmissions. Patients were received from 145 cities and towns; patients were also received from 10 other state institutions. One hundred and ten patients remained in the hospital at the end of the year.

Discharges during the year numbered 907. The condition of 176 was the same, 410 were improved, 57 unimproved, and 264 died. There were 113 autopsies.

The average stay in the hospital was 43.99 days per patient. The smallest number in the hospital on any one day was 102; the largest number 120. The average number of patients per day was 113.54.

The weekly clinic at the hospital was continued through the year with 49 clinics held. Visits to the regular Thursday clinic numbered 1,755, with an average attendance of 35. Patients making their first visit to the clinic numbered 758. Out-patient visits, other than the regular Thursday clinic, numbered 1,050. Of these, 79 were new patients. Total clinic visits, 2,805.

Two hundred and forty-four clinic patients subsequently entered the hospital.

*X-ray and Radium.*—Diagnostic X-ray plates taken, 2,703; fluoroscopic examinations, 335; X-ray treatments given, 3,804; radium treatments given, 530.

*Operations.*—There have been 496 operations. In addition, there were 1 esophagoscopy, 54 cystoscopies, 20 proctoscopies, and 3 bronchoscopies.

*Anesthesias.*—An anesthetic was given 695 times.

### DENTAL REPORT

Prophylaxis, 105; fillings (permanent teeth), 20; extractions (permanent teeth), 326; treatments, 157; restorations, 1; X-rays, 30; irrigations, 2; examinations, 587. Total, 1,228.

Total number of visits, 778; total number of new patients, 513; total number of dismissals, 221.

### CHANGES IN PERSONNEL

During the year additions and changes were made as follows:

*Visiting Staff:* Harry W. Harding, D.M.D. succeeded Emanuel Kline, D.M.D. resigned. Langdon Parsons, M.D. appointed Assistant Gynecologist. Eugene C. Glover, M.D. appointed Assistant Internist. Valmore A. Pelletier, M.D. appointed Assistant Surgeon, Out-patient Department.

*Resident Staff:* Valmore A. Pelletier, M.D. Assistant Superintendent, resigned. Richard W. Morris, M.D. appointed Resident Physician. J. Howard Howe, M.D.



succeeded James Shannon, M.D. resigned. Joseph L. Kennedy, M.D. succeeded J. Howard Howe, M.D. transferred to Westfield. Roy E. Mabrey, M.D. succeeded William R. Carson, M.D. resigned. Sylvan H. Robertson, M.D. appointed Resident Pathologist. Mary A. Rogan, R.N., Principal of School of Nursing, succeeded Veronica M. Beauregard, R.N. resigned.

During the past year, as in the preceding, increased activity has marked both the out-patient and the house services. The house has almost constantly been filled to capacity with a long list of patients waiting for admission. The out-patient department has also been taxed to capacity in caring for increased number of new, as well as of old, patients every week.

The addition of another visiting surgeon to the out-patient clinic on Thursday afternoons expedites examination and proper disposal of patients. The addition of an assistant gynecologist to the staff has facilitated the conduct of the ever-growing weekly gynecological clinics and care of the gynecological patients in the house.

The number of operations for all conditions has increased. There seems to be an increased number of patients with cancer still in the operable stage that seek admission to the house. The operating room staff has efficiently met the increasing demands made upon it.

The department of roentgenology and radium therapy is now fully equipped for diagnostic work and therapy. The portable Roentgen ray diagnostic machine enables taking of pictures of patients who are too sick on admission to be moved. The new roentgen ray therapy machine now makes possible the treatment of three patients at one time, as the machine with the air-cooled tube can be run at the same time with the one with the water-cooled tube. The power is kept constant in this new machine, insuring the delivery of more accurate dosage. The addition of four new 10 mg. platinum-iridium radium needles facilitates the treatment of large lesions with interstitial radiation. The hospital now has twelve such needles.

The establishment of a fully equipped pathological laboratory in the hospital and the addition of a full-time resident pathologist and a technician to the staff has been of great assistance. Reports of surgical specimens can now be obtained in half the time that it required previously when all specimens had to be sent to Boston. The danger of losing specimens while in transit has been eliminated. Frozen sections can now be done whenever required from specimens obtained in the operating room or in the out-patient department. The percentage of post-mortem examinations has increased.

Under the direction of the medical service special blood and metabolic studies are being made in many cases, especially those with lymphoblastoma, extensive bone metastases, and a selected number of those receiving Roentgen ray treatments.

The addition of an assistant visiting physician on the medical service has made it possible for patients receiving treatment for cancer to receive more attention to other complications that they may have in addition to cancer.

#### IMPROVEMENTS

During the year, three new filter beds have been built.

New gravel roofs have been put on the carpenter shop, storehouse, engine room, recreation hall, and garage. New platforms have been built on the storehouse and carpenter shop.

The old coal trestle, which was condemned earlier in the year, has been replaced by a new trestle.

A sound-picture machine has been installed in the recreation hall.

New steam mains are now being laid.

#### ACKNOWLEDGMENTS

It is a pleasure to acknowledge the work of the chaplains, Rev. Melville Shafer and Rev. Father Mitchell, also the Social Service Committee, and the cooperation of officers and employees of the hospital.

For your cooperation and counsel, I am deeply grateful.

Respectfully submitted,

GEORGE M. SULLIVAN,

*Superintendent.*

## POPULATION

	Males	Females	Totals
Number admitted during the year . . . . .	419	488	907
Number discharged during the year . . . . .	420	487	907
Number remaining in hospital at end of fiscal year . . . . .	60	50	110
Daily average attendance . . . . .	61.64	51.90	113.54
Daily average number of officers and employees . . . . .	44.99	70.46	115.45

## Financial Report, Pondville Hospital at Norfolk, 1931

To the Department of Public Health:

I respectfully submit the following report of the finances of this Institution for the fiscal year ending November 30, 1931.

## STATEMENT OF EARNINGS

Board of patients:			
Private . . . . .	\$24,600	98	
Cities and towns . . . . .	51,573	83	
			\$76,174 81
Personal services:			
Labor of employees . . . . .	\$21	00	
Reimbursement from Board of Retirement . . . . .	55	59	
			76 59
Sales:			
Food . . . . .	\$125	24	
Furnishings and household supplies . . . . .	1	00	
Heat, light and power . . . . .	123	33	
Garage, stable and grounds . . . . .	30	00	
Miscellaneous, junk . . . . .	30	75	
Board of employees and special nurses . . . . .	206	98	
			\$517 30
Miscellaneous:			
Interest on bank balances . . . . .	60	73	
			\$60 73
			\$60 73
Total . . . . .			\$60 73
Total earnings for the year . . . . .			\$76,829 43
Total cash receipts reverting and transferred to the State Treasurer . . . . .			54,315 94
Accounts Receivable outstanding Dec. 1, 1930 . . . . .		41,654	57
Accounts Receivable outstanding Nov. 30, 1931 . . . . .		64,168	06
Accounts Receivable increased . . . . .			22,513 49

## MAINTENANCE APPROPRIATION

Balance from previous year, brought forward . . . . .			\$1,276 67
Appropriation, current year:			
Radium . . . . .	\$10,000	00	
Other maintenance . . . . .	235,050	00	
			245,050 00
			\$246,326 67
Total . . . . .			\$246,326 67
Expenditures as follows:			
Personal services . . . . .	\$122,303	07	
Food . . . . .	35,265	84	
Medical and general care . . . . .	16,922	70	
Heat, light and power . . . . .	7,929	60	
Garage, stable and grounds . . . . .	1,658	33	
Travel, transportation and office expenses . . . . .	7,944	74	
Religious instruction . . . . .	1,200	00	
Clothing and materials . . . . .	1,011	65	
Furnishings and household supplies . . . . .	15,303	05	
Repairs, ordinary . . . . .	2,560	95	
Repairs and renewals . . . . .	6,595	91	
Radium . . . . .	7,039	70	
			\$225,735 54
Total Maintenance Expenditures . . . . .			\$225,735 54
Balance of Maintenance Appropriation, Nov. 30, 1931 . . . . .			\$20,591 13
Estimated Outstanding Liabilities, Nov. 30, 1931 . . . . .			\$11,527 79

## SPECIAL APPROPRIATIONS

Balance December 1, 1930, brought forward . . . . .			\$12,566 16
Appropriations for current year . . . . .			10,000 00
			\$22,566 16
Total . . . . .			\$22,566 16
Expended during the year (see statement below) . . . . .	\$11,115	66	
Reverting to Treasury of Commonwealth . . . . .	*31	23	
(Star balances below that are reverting)			11,146 89
			\$11,419 27
Balance November 30, 1931, carried to next year . . . . .			\$11,419 27

APPROPRIATION	Act or Resolve	Total Amount Ap- propriated	Expended during Fiscal Year	Total Expended to Date	Balance at End of Year
Hospital unit and out-patient de- partment . . . . .	1929, 1930	\$109,500 00	\$6,822 14	\$109,140 69	\$359 31
Additional fire protection . . . .	1928, 1930	17,000 00	314 37	16,980 89	19 11*
Improvements to sewer beds . . .	1929	1,200 00	-	1,187 88	12 12*
Recreation building . . . . .	1930	7,000 00	3,732 50	5,693 39	1,306 61
New filter beds . . . . .	1931	10,000 00	246 65	246 65	9,753 35
Totals . . . . .		\$144,700 00	\$11,115 66	\$133,249 50	\$11,450 50

## PER CAPITA

During the year the average number of patients has been . . . . .	113.55
Total cost of maintenance . . . . .	225,735 54
Equal to a weekly per capita cost of (52 weeks to year) . . . . .	38 23
Total receipts for the year . . . . .	54,315 94
Equal to a weekly per capita of . . . . .	9 20
Total net cost of maintenance for year (total maintenance less total receipts) . . . . .	171,419 60
Net weekly per capita . . . . .	29 03

Respectfully submitted,

MARION MACKENZIE,  
*Treasurer.*

## Inventory: Pondville Hospital at Norfolk

## GRAND SUMMARY SHEET

November 30, 1931

## REAL ESTATE

Land, 324.2 acres . . . . .	\$16,637 97
Buildings . . . . .	488,989 73
Betterments (additions and improvements) . . . . .	10,889 43
Total . . . . .	\$516,517 13

## PERSONAL PROPERTY UNDISTRIBUTED SUPPLIES

Travel, transportation and office expenses . . . . .	\$1,434 25
Food . . . . .	2,105 64
Clothing and materials . . . . .	879 18
Furnishings and household supplies . . . . .	2,963 88
Medical and general care . . . . .	16,351 20
Heat, light and power . . . . .	2,341 75
Farm . . . . .	-
Garage, stable and grounds . . . . .	107 00
Repairs . . . . .	7,364 94
Total . . . . .	\$33,548 89

## PERSONAL PROPERTY DISTRIBUTED SUPPLIES

Travel, transportation and office expenses . . . . .	\$3,751 96
Clothing and materials . . . . .	1,280 75
Furnishings and household supplies . . . . .	53,901 49
Medical and general care . . . . .	46,027 98
Garage, stable and grounds . . . . .	7,927 60
Repairs . . . . .	3,990 38
Total . . . . .	\$116,880 16
Less 5% Depreciation . . . . .	5,844 01
	\$111,036 15

## GRAND SUMMARY

Real Estate — Total . . . . .	\$516,517 13
Personal Property—Undistributed Supplies, Total . . . . .	\$33,548 89
Personal Property—Distributed Supplies, Total . . . . .	111,036 15
	144,585 04
	\$661,102 17
Radium (in vault of emanation plant) . . . . .	69,880 30
Grand Total . . . . .	\$730,982 47

## Statistical Tables

TABLE 1.—Admissions and Discharges

	Males	Females	Total
Patients in hospital December 1, 1930 . . . . .	61	49	110
Patients admitted from December 1, 1930, to November 30, 1931, in- clusive . . . . .	419	488	907
Patients discharged from December 1, 1930, to November 30, 1931, in- clusive . . . . .	420	487	907
Patients remaining in hospital November 30, 1931 . . . . .	60	50	110
Daily average number of patients . . . . .	61.64	51.90	113.54
Deaths (included in number discharged) . . . . .	148	116	264



TABLE 2.—*Readmissions*

	Males	Females	Total
Total patients treated	480	537	1,017
Less old patients readmitted first time since December 1, 1930	35	58	93
Less other readmissions	91	97	188
Less patients in hospital December 1, 1930	61	49	110
Number new patients admitted from December 1, 1930, to November 30, 1931	293	333	626
Total number different patients treated December 1, 1930, to November 30, 1931	389	440	829

The following statistical tables are based on the number of new patients admitted.

TABLE 3.—*Civil Condition of Patients Admitted*

	Males	Females	Total
Single	53	42	95
Married	163	193	356
Widowed	72	80	152
Divorced	1	11	12
Separated	4	7	11
Totals	293	333	626

TABLE 4.—*Age of Patients Admitted*

	Males	Females	Total
Under 20 years	5	3	8
20 to 29 years	4	15	19
30 to 39 years	11	39	50
40 to 49 years	36	97	133
50 to 59 years	62	83	145
60 to 69 years	88	67	155
70 to 79 years	70	22	92
80 to 89 years	15	7	22
90 to 99 years	2	0	2
Totals	293	333	626

TABLE 5.—*Nativity of Patients Admitted*

	Males	Females	Total		Males	Females	Total
United States	149	189	338	Lithuania	5	2	7
Armenia	1	0	1	Norway	1	1	2
Austria	0	2	2	Poland	5	6	11
Canada	36	46	82	Portugal	4	4	8
England	13	11	24	Russia	5	3	8
Finland	2	5	7	Scotland	9	4	13
France	1	3	4	Sweden	5	2	7
Germany	3	2	5	Switzerland	0	3	3
Greece	1	1	2	Syria	1	3	4
Ireland	38	35	73	Wales	0	1	1
Italy	14	10	24				
Totals	293	333	626				

TABLE 6.—*Residence of Patients Admitted*

Abington	4	Falmouth	1	Medford	4	Salisbury	1
Adams	3	Fitchburg	8	Methuen	4	Saugus	1
Agawam	1	Foxboro	7	Middleboro	3	Scituate	1
Amesbury	2	Framingham	4	Middleton	1	Sharon	2
Arlington	2	Franklin	11	Milford	3	Shelburne	1
Ashburnham	2	Gardner	5	Millis	4	Shirley	1
Ashland	2	Gloucester	1	Millville	2	Shrewsbury	1
Athol	7	Grafton	1	Milton	2	Somerville	8
Attleboro	24	Great Barrington	3	Nahant	1	Southbridge	3
Becket	1	Greenfield	1	Natick	2	Spencer	1
Bellingham	4	Halifax	1	Needham	2	Springfield	23
Belmont	1	Hanover	1	New Bedford	11	Stoneham	2
Beverly	2	Hanson	2	New Salem	1	Sutton	1
Blackstone	3	Haverhill	7	Newburyport	4	Swampscott	2
Boston	90	Hingham	1	Newton	1	Taunton	12
Braintree	1	Holliston	4	North Adams	3	Templeton	1
Bridgewater	2	Holbrook	1	North Andover	1	Tewksbury	1
Brockton	21	Holyoke	3	North Attleboro	18	Townsend	2
Brookline	1	Hopkinton	1	North Brookfield	1	Upton	1
Cambridge	11	Hudson	1	Northampton	1	Uxbridge	3
Canton	1	Ipswich	1	Northboro	1	Walpole	8
Chelsea	7	Lawrence	16	Northbridge	2	Watertown	1
Chicopee	4	Lee	3	Norton	5	Webster	2
Clinton	1	Leominster	6	Norwood	11	West Springfield	2
Colrain	2	Lexington	1	Orange	1	Westfield	2
Danvers	2	Lowell	6	Peabody	2	Westwood	3
Dartmouth	2	Ludlow	1	Pittsfield	9	Weymouth	3
Dedham	8	Lunenburg	2	Plainville	3	Whitman	3
Dighton	2	Lynn	17	Plymouth	1	Winchendon	2
Dracut	1	Malden	3	Plympton	1	Winchester	1
East Bridgewater	2	Mansfield	6	Quincy	5	Winthrop	1
Easthampton	1	Marion	1	Raynham	3	Woburn	2
Easton	2	Marshfield	1	Rehoboth	1	Worcester	14
Edgartown	1	Mattapoisett	1	Revere	2	Wrentham	4
Everett	2	Maynard	3	Rockland	2	Yarmouth	1
Fall River	13	Medfield	4	Salem	4	State Institutions	16

TABLE 7.—*Occupation of Patients Admitted*

	Males	Fe- males	Totals		Males	Fe- males	Totals
Axe welder . . . . .	1	—	1	Laundress . . . . .	—	2	2
Baker . . . . .	2	—	2	Lawyer . . . . .	1	—	1
Barber . . . . .	3	—	3	Leather worker . . . . .	1	—	1
Basket maker . . . . .	1	—	1	Loom fixer . . . . .	1	—	1
Bricklayer . . . . .	1	—	1	Machinist . . . . .	10	—	10
Building wrecker . . . . .	1	—	1	Maid . . . . .	—	1	1
Bus boy . . . . .	2	—	2	Matron . . . . .	—	1	1
Butcher . . . . .	1	—	1	Mechanic . . . . .	5	—	5
Buyer . . . . .	1	—	1	Mechanical engineer . . . . .	1	—	1
Cabinet maker . . . . .	1	—	1	Metal worker . . . . .	1	—	1
Carder . . . . .	—	1	1	Milkman . . . . .	1	—	1
Carpenter . . . . .	19	—	19	Mill overseer . . . . .	1	—	1
Cemetery superintendent . . . . .	1	—	1	Motorman . . . . .	1	—	1
Chair maker . . . . .	1	—	1	Moulder . . . . .	1	—	1
Chambermaid . . . . .	—	1	1	Night watchman . . . . .	1	—	1
Chauffeur . . . . .	4	—	4	None . . . . .	21	24	45
Cleaner . . . . .	—	1	1	Nurse . . . . .	—	7	7
Clerical worker . . . . .	1	1	2	Optical worker . . . . .	1	—	1
Clerk . . . . .	5	—	5	Osteopath . . . . .	1	—	1
Coal heaver . . . . .	1	—	1	Painter . . . . .	8	—	8
Collector . . . . .	1	—	1	Physician . . . . .	1	1	2
Comb maker . . . . .	2	—	2	Polisher . . . . .	2	—	2
Cook . . . . .	—	4	4	Prison officer . . . . .	1	—	1
Cooper . . . . .	1	—	1	Public accountant . . . . .	1	—	1
Court officer . . . . .	1	—	1	Retailer . . . . .	1	—	1
Cranberry grower . . . . .	1	—	1	Roofer . . . . .	1	—	1
Dealer . . . . .	4	—	4	Rope maker . . . . .	1	—	1
Decorator . . . . .	1	—	1	Salesman . . . . .	5	—	5
Demonstrator . . . . .	—	1	1	Sandwich maker . . . . .	—	1	1
Dietitian . . . . .	—	1	1	Seaman . . . . .	2	—	2
Dressmaker . . . . .	—	2	2	Seamstress . . . . .	—	3	3
Editor . . . . .	1	—	1	Secretary . . . . .	—	1	1
Electrician . . . . .	2	—	2	Shipper . . . . .	1	—	1
Elevator operator . . . . .	2	—	2	Shoe clerk . . . . .	—	1	1
Engineer . . . . .	5	—	5	Shoe worker . . . . .	8	2	10
Expressman . . . . .	1	—	1	Silversmith . . . . .	1	—	1
Factory and mill worker . . . . .	16	9	25	Spinner . . . . .	2	1	3
Farmer . . . . .	12	—	12	Station attendant . . . . .	2	—	2
Film inspector . . . . .	—	1	1	Starcher . . . . .	1	—	1
Fireman . . . . .	5	—	5	Steam engineer . . . . .	1	—	1
Fisherman . . . . .	1	—	1	Steam fitter . . . . .	4	—	4
Fruit farmer . . . . .	1	—	1	Stenographer . . . . .	—	1	1
Gardener . . . . .	1	—	1	Stockbroker . . . . .	1	—	1
Gas fitter . . . . .	1	—	1	Stock clerk . . . . .	2	—	2
General work (golf club) . . . . .	1	—	1	Storekeeper . . . . .	1	—	1
Glass selector . . . . .	1	—	1	Straw worker . . . . .	1	—	1
Grave digger . . . . .	1	—	1	Student . . . . .	1	—	1
Hat maker . . . . .	1	—	1	Tailor . . . . .	2	—	2
Helper (tannery) . . . . .	1	—	1	Teacher . . . . .	1	2	3
Hod carrier . . . . .	1	—	1	Teamster . . . . .	4	—	4
Homemaker . . . . .	—	232	232	Tender, R.R. crossing . . . . .	1	—	1
Hospital worker . . . . .	—	1	1	Toy maker . . . . .	1	—	1
Hotel proprietor . . . . .	1	—	1	Trackman, R.R. . . . .	3	—	3
Housekeeper . . . . .	—	9	9	Truck driver . . . . .	4	—	4
Housework . . . . .	—	16	16	Trunk maker . . . . .	1	—	1
Ice man . . . . .	2	—	2	Waiter . . . . .	1	—	1
Insurance agent . . . . .	1	—	1	Waitress . . . . .	—	1	1
Iron moulder . . . . .	2	—	2	Watchmaker . . . . .	1	—	1
Janitor . . . . .	4	—	4	Weaver . . . . .	6	2	8
Jeweler . . . . .	3	—	3	Welder . . . . .	1	—	1
Jewelry worker . . . . .	2	2	4	Yard helper . . . . .	1	—	1
Kitchen helper . . . . .	1	—	1				
Laborer . . . . .	42	—	42	Totals . . . . .	293	333	626

TABLE 8.—*Stage of Disease of Patients Admitted*

	Males	Females	Total
Early . . . . .	57	91	148
Moderately advanced . . . . .	105	119	224
Advanced . . . . .	130	119	249
Non-malignant . . . . .	1	2	3
Postoperative . . . . .	0	1	1
No disease . . . . .	0	1	1
Totals . . . . .	293	333	626

TABLE 9.—*Condition of Patients Discharged*

	Males	Females	Total
Same . . . . .	77	99	176
Improved . . . . .	179	231	410
Unimproved . . . . .	16	41	57
Totals . . . . .	272	371	643

TABLE 10.

This table includes all new cases treated, both in- and out-patients. In a few instances the same patient has been counted twice or more times, according to the varying conditions presented.

	Males	Females	Totals		Males	Females	Totals
<b>CARCINOMA:</b>				<b>Other Sites:</b>			
Breast . . . . .	-	76	76	Abdomen . . . . .	0	1	1
Buccal Cavity: . . . . .				Antrum . . . . .	1	0	1
Alveolus . . . . .	1	2	3	Bronchus . . . . .	1	0	1
Buccal mucosa . . . . .	8	-	8	Larynx . . . . .	15	0	15
Floor of mouth . . . . .	7	-	7	Lung . . . . .	2	1	3
Jaw . . . . .	3	1	4	Pyriform sinus . . . . .	1	0	1
Lip . . . . .	32	2	34	Sinuses . . . . .	1	0	1
Palate . . . . .	4	1	5				
Parotid . . . . .	1	1	2	Totals . . . . .	21	2	23
Tongue . . . . .	22	1	23	Lymphoblastoma . . . . .	6	6	12
Tonsil . . . . .	9	2	11	<b>Sarcoma:</b>			
Uvula . . . . .	1	-	1	Breast . . . . .	0	1	1
Totals . . . . .	88	10	98	Femur . . . . .	2	0	2
<b>Female Genital Organs:</b>				Heel . . . . .	1	1	2
Cervix . . . . .	-	88	88	Jaw . . . . .	1	0	1
Ovary . . . . .	-	7	7	Leg . . . . .	2	0	2
Uterus . . . . .	-	9	9	Ovary . . . . .	0	1	1
Vagina . . . . .	-	1	1	Retroperitoneal . . . . .	1	0	1
Vulva . . . . .	-	6	6	Skull . . . . .	1	0	1
Totals . . . . .	-	111	111	<b>Amelanotic sarcoma:</b>			
<b>Male Genital Organs:</b>				Lung . . . . .	0	1	1
Penis . . . . .	6	-	6	Unknown focus . . . . .	0	1	1
Prostate . . . . .	21	-	21	<b>Angiosarcoma:</b>			
Scrotum . . . . .	2	-	2	Frontal sinus . . . . .	0	1	1
Testicle . . . . .	3	-	3	<b>Fibrosarcoma:</b>			
Totals . . . . .	32	-	32	Breast . . . . .	0	1	1
<b>Peritoneum, Intestines,</b>				<b>Leiomyosarcoma:</b>			
<b>Rectum, etc.:</b>				Cervix . . . . .	0	1	1
Anal canal . . . . .	-	1	1	Uterus . . . . .	0	1	1
Cecum . . . . .	3	1	4	<b>Melanotic sarcoma:</b>			
Colon . . . . .	4	2	6	Eye . . . . .	0	1	1
Intestines . . . . .	-	2	2	Face . . . . .	1	0	1
Rectum . . . . .	20	15	35	Toe . . . . .	0	1	1
Rectosigmoid . . . . .	-	1	1	<b>Osteogenic sarcoma:</b>			
Sigmoid . . . . .	1	2	3	Femur . . . . .	0	1	1
Totals . . . . .	28	24	52	Thigh . . . . .	0	1	1
<b>Skin:</b>				Tibia . . . . .	1	0	1
Abdominal wall . . . . .	1	-	1	<b>Perineural fibrosarcoma:</b>			
Arm . . . . .	1	-	1	Thigh . . . . .	1	0	1
Back . . . . .	1	1	2	Totals . . . . .	11	13	24
Breast . . . . .	1	-	1	<b>Other Malignancy . . . . .</b>			
Canthus . . . . .	4	-	4		11	5	16
Cheek . . . . .	14	7	21	<b>Non-Malignant Tumors:</b>			
Chin . . . . .	2	-	2	Adenomas . . . . .	-	4	4
Ear . . . . .	8	1	9	Adenofibromas . . . . .	-	4	4
Eyebrow . . . . .	1	-	1	Angiomas . . . . .	3	1	4
Eyelid . . . . .	7	2	9	Fibromas . . . . .	4	11	15
Face . . . . .	8	2	10	Fibroids . . . . .	-	25	25
Finger . . . . .	1	-	1	Hemangiomas . . . . .	5	3	8
Foot . . . . .	1	-	1	Lipomas . . . . .	6	7	13
Forehead . . . . .	4	3	7	Papillomas . . . . .	9	11	20
Hand . . . . .	5	-	5	Polyps . . . . .	-	17	17
Hip . . . . .	1	-	1	<b>Other non-malignant tumors . . . . .</b>			
Leg . . . . .	1	1	2		27	57	84
Lip . . . . .	-	1	1		54	140	194
Neck . . . . .	6	2	8	<b>Other Diseases:</b>			
Nose . . . . .	13	7	20	Diseases of the abdomen, peritoneum, etc. . . . .	2	15	17
Orbit . . . . .	-	1	1	Diseases of the bladder . . . . .	2	3	5
Prauricular region . . . . .	2	1	3	Diseases of the blood . . . . .	3	3	6
Scalp . . . . .	2	1	3	Diseases of the bones, joints, muscles, etc. . . . .	7	9	16
Scapular region . . . . .	2	-	2	Diseases of the breast . . . . .	1	28	29
Temple . . . . .	3	1	4	Diseases of the circulatory system . . . . .	31	26	57
Thigh . . . . .	-	1	1	Diseases of the ductless glands . . . . .	2	3	5
Totals . . . . .	88	31	119	Diseases of the esophagus . . . . .	1	-	1
<b>Stomach, Liver, etc.:</b>				Diseases of the eye . . . . .	1	-	1
Epiglottis . . . . .	3	1	4	Diseases of the female genital organs . . . . .	-	88	88
Esophagus . . . . .	10	3	13	Diseases of the intestines: . . . . .			
Gall Bladder . . . . .	-	3	3	Constipation . . . . .	1	4	5
Liver . . . . .	1	1	2	Diverticulitis . . . . .	4	1	5
Pancreas . . . . .	1	-	1	Duodenal ulcer . . . . .	11	4	15
Pharynx . . . . .	3	-	3	Other diseases . . . . .	4	7	11
Stomach . . . . .	13	8	21	Diseases of the kidney and ureter . . . . .	8	9	17
Totals . . . . .	31	16	47	Diseases of the larynx . . . . .	-	1	1
<b>Urinary organs . . . . .</b>							
	10	5	15				



TABLE 10.—Continued

	Males	Females	Totals		Males	Females	Totals
Diseases of the liver and and biliary tract . .	12	32	44	Diseases of the pancreas	-	1	1
Diseases of the lung . .	4	1	5	Diseases of the pleura and mediastinum . .	1	2	3
Diseases of the lym- phatic system . . .	2	3	5	Diseases of the rectum and anus . . . . .	5	6	11
Diseases of the male genital organs . . .	7	-	7	Diseases of the sigmoid	-	1	1
Diseases of metabolism and deficiency . . .	1	9	10	Diseases of the skin:			
Diseases of the mouth, lips, cheeks, pharynx, tonsils, and palate . .	14	-	14	Keratosis . . . . .	32	20	52
Diseases of the nervous system . . . . .	4	6	10	Other diseases . . .	9	8	17
Diseases of the nose and accessory sinuses . .	2	5	7	Diseases of the stomach	7	6	13
				Diseases of the trachea and bronchus . . . .	1	-	1
				Diseases of the urethra	1	4	5
				Other conditions . . .	37	28	65
				No disease . . . . .	21	27	48
				No diagnosis . . . . .	14	19	33

## REPORT OF THE DIVISION OF WATER AND SEWAGE LABORATORIES

H. W. CLARK, *Director and Chief Chemist*

This Division, consisting of laboratories in the State House and the Lawrence Experiment Station and its laboratories, carried on its usual volume of analytical and research work during the year 1931. The results of all the chemical analyses made by this Division of public water supplies, rivers, sewage applied to and the effluents from municipal sewage disposal areas, etc., are summarized in tables presented in the report of the Division of Sanitary Engineering. Besides the analytical and research work a considerable amount of field work was done during the year in connection with the examination of water supplies, rivers, industrial wastes, shellfish purification, etc.

The following table summarizes the analytical work of this Division and a résumé of some of its research work is given on following pages.

### *State House Laboratories*

Samples from public water supplies:	
Surface waters . . . . .	2,968
Ground waters . . . . .	1,678
Samples from domestic wells, ice supplies, swimming pools, etc. . . . .	592
Samples from rivers . . . . .	1,497
Samples from sewage disposal works:	
Sewages . . . . .	741
Effluents . . . . .	510
Samples of wastes and effluents from factories . . . . .	63
Samples of sea water . . . . .	101
Miscellaneous samples (partial analyses) . . . . .	98
Samples in connection with the investigation of the Malden and Mystic rivers . . . . .	320
Special examinations of water (including field work) for manganese, lead, oil, alkalinity, fats, dissolved oxygen, carbonic acid, hydrogen ion, B.O.D., copper, iron scale, sulphates, sodium silicate, and incrustants . . . . .	2,894
Mineral analyses and gas analyses . . . . .	34
Microscopical examinations . . . . .	3,234

### *Lawrence Experiment Station*

Chemical examinations on account of investigations concerning the disposal of domestic sewage and factory wastes, filtration and other treatment of water supplies, swimming pools, and the investigation of the Merrimack and other rivers . . . . .	1,698
Mechanical and chemical examinations of sands . . . . .	130
Bacterial examinations of water supplies, rivers, sewages and filter effluents, ice, swimming pools, wastes, etc. . . . .	6,578
Bacterial examinations in connection with methods of purification of sewage and water . . . . .	745
Bacterial examinations of shellfish and sea waters . . . . .	1,422

### CARBON MONOXIDE DEATHS

During the year this Division was called upon on two occasions to determine the cause of deaths (1) in a dry well, or manhole, in Cambridge where two men died instantly; and (2) in a house in Holyoke where two adults were found dead. In both places, it was proved satisfactorily that these deaths were caused by carbon monoxide gas, — in the first instance by accumulation of monoxide in this dry well, or manhole; and in the second, by the entrance into the house of this gas from a smouldering fire burning below the surface of the filled land or dump upon which the house was built.

### FIELD WORK

A large volume of field work, consuming much time, was done by the chemists of this Division during the year in approximately forty cities and towns of the State on account of questions arising concerning swimming pools, rivers, water supplies

sewage and industrial waste disposal, shellfish, deaths from carbon monoxide, etc.. etc. In the course of this work much study was made of the condition of the Blackstone River, the wastes entering it, especially those from the steel and iron works in the city of Worcester, and of the efficiency of the sewage filtration plant treating Worcester sewage. Much work was also done in regard to the corrosive properties, if any, of the river water when used for boiler purposes and of the chief factors in the water responsible for corrosion.

SHELLFISH

Twelve hundred and fifty samples of shellfish were examined during the year and a member of the laboratory force appeared in a number of court prosecutions of sellers of polluted clams. Considerable experimental work was carried on in regard to comparisons of bacterial scores of clams shucked in the laboratory with ordinary cleanliness and commercially shucked stock. It was found that with ordinary care the score of shucked clams need not be materially higher than that of the unshucked. This is contrary to what is found with much commercially shucked stock and indicates what observations of some shucking plants have also shown,—that greater cleanliness is necessary in these plants.

EFFECT OF DYE WASTES ON SEWAGE PURIFICATION

A request was made to the Department for information as to the effect of adding 5,000 gallons daily of dye waste to the sewage passing to a municipal filtration area, and to study this, three small sand filters, each containing 3½ feet in depth of sand of an effective size of .25 millimeter, were operated at the Experiment Station for fourteen weeks. The strong dye waste was black but when diluted the color could be read, and was about 16,000. It had a bicarbonate alkalinity of 250 parts in 100,000 and a carbonate alkalinity of 50 parts in 100,000. The average rate of the municipal filters is 63,000 gallons per acre daily and the daily flow of sewage 563,000 gallons, making the proportion of waste to sewage 1 to 112. One of the experimental filters was operated at a 63,000-gallon rate with sewage and waste in this proportion. Another filter was operated with five times this proportion of waste and the third with sewage alone as a control. There were two things to be determined: (1) whether the waste would interfere with the operation of the filters; and (2) the amount of color that could be removed. The results showed conclusively that neither the anticipated volume of waste nor an amount five times larger would interfere with the normal operation of the filters. The filter receiving sewage containing 1.12 per cent by volume of waste removed an average of 88.2 per cent of the color. The amount decreased the longer the filter was operated and, as during the last three weeks of operation the per cent removal was fully 75.2, it seems probable that the color removal would eventually reach a fairly constant level and that the effluent would not be of an objectionable color. The filter receiving 5.6 per cent of waste gave a color reduction of only 42 per cent.

Average Analyses  
[Parts in 100,000]

	Raw Dye Waste	Lawrence Sewage	Control Filter	Effluent from Filter Receiving	
				1.12 Per Cent Dye Waste	5.6 Per Cent Dye Waste
Color	16,000.0	6.00	2.20	22.3	550.0
Total Solids . . . . .	2,848.0	—	—	—	—
Loss on Ignition . . . . .	400.0	—	—	—	—
Ammonia:					
Free	3.20	5.63	0.93	0.64	0.55
Total Albuminoid . . . . .	6.40	0.81	0.047	0.081	0.140
Albuminoid in Solution . . . . .	3.60	0.46	—	—	—
Chlorine . . . . .	1,360.0	8.5	8.5	21.4	73.1
Nitrogen as:					
Nitrates . . . . .	—	—	4.84	4.85	4.62
Nitrites . . . . .	—	—	.0100	.0495	.0530
Oxygen Consumed . . . . .	124.0	4.08	0.38	0.80	5.47
Alkalinity:					
Methyl Orange	300.0	—	3.3	5.5	17.0
Phenolphthalein . . . . .	50.0	—	0.0	0.0	0.0



## WASTES FROM THE MANUFACTURE OF ELASTIC WEBBING

During the year the question of the disposal of wastes from a factory engaged in the manufacture of elastic webbing was investigated. These wastes consisted of sizing solutions, bleaching and dye liquors and washings from all three, and of the sewage from about one hundred and fifty employees. The sizing solutions contained gum arabic and Swiss gum which is apparently a form of starch. The analyses and volumes of the principal wastes are shown here.

*Average Analyses*

[Parts in 100,000]

WASTE	Residue on Evaporation		Kjeldahl Nitrogen	Oxygen Consumed	Alkalinity	
	Total	Loss on Ignition			Methyl-Orange	Phenolphthalein
Gum arabic . . . . .	2,520	2,420	8.79	347.0	—	—
Swiss gum . . . . .	8,272	8,206	2.96	331.0	—	—
Bleach liquor . . . . .	896	345	6.44	76.5	341.0	245
Dye liquor . . . . .	214	51	0.20	11.8	10.5	0

*Volume of Wastes*

	Gallons per Day	Per Cent of Total
Domestic sewage . . . . .	4,300	48.1
Gum arabic and Swiss gum . . . . .	150	1.7
Dye liquor . . . . .	1,000	11.2
Bleach liquor . . . . .	1,000	11.2
Washings . . . . .	2,500	27.8
Total . . . . .	8,950	100.0

The present method of waste disposal at the plant is to run the wastes through several covered settling tanks and then through a small pond from which some of the liquid is supposed to leach. The amount of leaching is insignificant, however, as a considerable stream runs from the outlet of the pond and spreads over a field, eventually finding its way into a small brook. The gum arabic is apparently very stable but the Swiss gum in passing through the settling tanks is attacked by an acid fermentation, causing foul odors and creating a nuisance. The dye and bleach liquors are inoffensive. To find a way of relieving these conditions, certain experiments were made at the Experiment Station. It was evident that the sizing solutions were the ones causing the most trouble and the only practical method of dealing directly with wastes containing from 2 to 8 per cent of organic matter is by evaporation and incineration; and as the volume at this plant was only 150 gallons a day, this is a practicable method. An alternative method would be to spray the wastes into the fire box under the boilers; but a procedure which would be more likely to be consistently followed at such a plant is the one by which the combined wastes would be treated by filtration, hence a mixture was made representing the average waste from the plant and a number of small filters were operated at the Experiment Station with this mixture which was prepared fresh daily. All of these filters contained  $3\frac{1}{2}$  feet in depth of sand of an effective size of .25 millimeter. Filter No. 582 received a mixture representing an average of the various wastes, sewage and washings at a rate of 25,000 gallons per acre daily and Filter No. 585 received the same mixture at a rate of 12,500 gallons per acre daily. At the beginning of the experiments it was thought that some preliminary treatment of the wastes might be advisable before applying them to the sand filters, hence a shallow trickling filter, No. 583, containing  $3\frac{1}{2}$  feet in depth of stone from one of the Station trickling filters, was operated at a rate of 500,000 gallons per acre daily with the mixed wastes. The effluent from this filter was then applied to sand Filter No. 584 at a 25,000-gallon rate. Another sand filter, No. 586, was operated at the same rate and with the same mixture of wastes except that only one-tenth the amount of finish wastes was added. This was on the supposition that the bulk of the finish wastes would be disposed of by evaporation and only the washings enter the drains.

For the first three weeks the mixture of wastes applied to the filters was made up in the theoretical proportion. For the next five weeks, the sewage used was diluted

one-half with tap water but for the last two weeks full strength sewage was used; during the last four weeks the proportion of finish wastes was increased 50 per cent as such an increase is liable to occur for short periods at the plant. These changes made no significant difference in the effluents of the various filters so the average analyses for the whole period are given.

*Average Analyses*

*Mixed Wastes applied to Filters Nos. 582, 583 and 585*

[Parts in 100,000]

Color	AMMONIA			KJELDAHL NITROGEN		NITROGEN AS		Oxygen Consumed	ALKALINITY	
	Free	ALBUMINOID		Total	In Solution	Nitrates	Nitrites		Methyl Orange	Phenol- phthalein
		Total	In Solution							
-	1.18	.83	.65	1.62	1.22	-	-	22.7	44.0	12.7
Effluent from Filter No. 582										
1.85	.043	.114	-	-	-	2.23	.0727	1.86	37.2	3.3
Effluent from Filter No. 583										
.99	.21	.79	.51	1.43	-	.14	.0248	8.24	48.0	0.0
Effluent from Filter No. 584										
1.50	.398	.158	-	-	-	1.37	.0350	1.98	33.0	0.8
Effluent from Filter No. 585										
2.24	.35	.191	-	-	-	2.51	.0640	3.12	23.4	0.0
Effluent from Filter No. 586										
1.15	.028	.099	-	-	-	1.38	.1606	1.47	39.9	2.9

As far as these results go they indicate that the mixed wastes can be nitrified and all the sand filter effluents were stable. The trickling filter was operated, of course, only as a roughing filter. It was not considered necessary to test for gum arabic as, as stated, the effluents were stable. There was no sign of clogging of the surface of the sand filters after ten weeks' operation and an inspection of the sand showed no stickiness.

STUDIES OF WASTES FROM TANNERIES, FELT WORKS AND GELATIN WORKS

Studies have been carried on continuously since 1927 on the removal of caustic lime from various industrial plants in Peabody and Salem by carbonation with flue gas, and carbonating plants have now been in operation at certain of these plants for several years. During the past year or two some of the first plants have been improved, additional ones have been built and others have been planned. The effect of the plants so far installed is shown in a decided slowing up in the rate of scale formation in the sewers and pumping station. During 1931 the laboratory work in connection with this study consisted largely of the determination of lime and various forms of alkalinity in 334 samples of wastes and sewage from the South Essex Sewerage District. Soluble lime salts, other than calcium hydroxide, were determined in 60 samples of sewage at the Salem pumping station just before the sewage was pumped out to sea. The average amount of these salts found was equivalent to 39.1 parts in 100,000 calcium sulphate. Since caustic soda reacts with calcium sulphate to form calcium hydroxide and sodium sulphate, and hence scale, it is obvious that caustic soda in the wastes must before entering the sewers be carbonated the same as caustic lime but it has been difficult to convince one or two companies of this fact. Most plants that use lime also use a certain amount of acid but usually the amount of acid is small. At two plants, however, the amount of acid used is large and by pumping the lime and acid wastes to a common tank, the necessity of a carbonating plant is removed. The average effluent of these two tanks contained over 8 per cent of acid.

## BIOCHEMICAL OXYGEN DEMAND

The B.O.D. and dissolved oxygen of the Merrimack River were determined on six occasions from June to November, inclusive, at the same stations as during the two previous years. The results were very similar to those shown in the diagrams in the last report.

STATION	B.O.D. [Parts in 100,000]	DISSOLVED OXYGEN Per Cent of Saturation
At Tyngsborough . . . . .	.19	78.2
Above Lowell . . . . .	.21	77.7
Below Lowell . . . . .	.36	81.6
Above Lawrence . . . . .	.24	76.0
Below Lawrence . . . . .	1.87	66.1
Above Haverhill . . . . .	.64	62.6
At Groveland . . . . .	.57	44.5
Above Amesbury . . . . .	.45	58.2
Above Newburyport . . . . .	.42	51.4

An illustration of the effect of the trade wastes on the B.O.D. was given by the samples collected in October when most of the Lawrence mills were closed by a strike, only a small volume of industrial wastes was entering the river and the B.O.D. of the river below Lawrence was only 40 per cent of the normal amount.

## SULPHUR COMPOUNDS IN THE AIR

It has been stated by certain authorities that the soft waters of the New England states are indirectly responsible for injury to clothes washed in New England homes and laundries; in other words, it is claimed that there is insufficient alkalinity in clothes washed in soft water to neutralize  $\text{SO}_3$  or  $\text{H}_2\text{SO}_4$  absorbed from the air during drying. The  $\text{SO}_3$  in the air is, of course, due to the combustion of soft coal and fuel oil containing sulphur; and the amount of sulphur compounds discharged into the air of a large city is enormous. Green\* estimates that if the sulphur emitted from stacks in the city of Cleveland were oxidized, 175,000 tons a year of sulphuric acid would result. Without wishing to enter into any controversy, it was decided to investigate the conditions as to sulphur compounds in the air in the vicinity of the Experiment Station. The Station is located near the southeast boundary of Lawrence and is comparatively near the stacks of seven or eight large mills, at least two of which burn fuel oil. Rain water or melted snow was collected from the Station rain gage and analysis made of each gallon, the  $\text{SO}_3$  found ranging from .71 part to 2.73 parts in 100,000. The pH of this water was never below 6.0 and there was always a considerable amount of cinders and fine ash present which may have neutralized any possible acidity. Of course, water with a pH of 6.0 is on the acid side but this acidity might easily be due in a practically unbuffered water to free carbon dioxide.

*SO<sub>3</sub> in Rain Water and Melted Snow*

1931		SO <sub>3</sub> [Parts in 100,000]
March	5 (melted snow)	0.445
March	9 (rain water)	2.73
May	7 " "	2.46
July	9 " "	0.71
September	1 " "	1.98
December	1 " "	1.08

The amount of  $\text{SO}_3$  in rain water, however, is not a direct measure of the amount in the atmosphere, a more direct measure being obtained by determining the  $\text{SO}_3$  absorbed by damp clothing hung out to dry. For this purpose some new unbleached cotton cloth was first tried but as it was found impracticable to wash this cloth free from sulphates, old sheeting was finally used instead as this could be readily washed practically free from sulphates. The procedure followed was to expose the wet cloth to the air for the desired time and then to roll it up and place it in a percolator and allow distilled water to percolate through very slowly, two gallons usually being used although one was generally sufficient to remove all the  $\text{SO}_3$ . It was found that a surprising amount of organic matter was dissolved out by distilled

\*American Journal of Public Health, Vol. XXI, page 240.



water from this cloth that had seen several years of service and this probably has some bearing on the loss of strength of cotton goods with use. The gallon or more of water used was concentrated with a small amount of sodium carbonate, the organic matter burned off and  $\text{SO}_3$  determined as usual, taking precautions against contamination by sulphur from the gas burners. The piece of cloth used contained 18 square feet and after moistening each day for seven days with distilled water, was hung out to dry, when .0424 gram  $\text{SO}_3$  was recovered from the cloth. On another day, after seven hours' exposure, .0086 gram  $\text{SO}_3$  was obtained and the wash water had a pH of 6.5, about the same as the water before contact with the cloth. In a third test, the cloth was exposed a total of forty-eight hours in eight days and moistened with distilled water eleven times; .0332 gram of  $\text{SO}_3$  was then obtained and the pH of the wash water was 4.0. This corresponds to an acidity of the order of .0001 normal.

From these results it is evident that insignificant amounts of  $\text{SO}_3$  are taken up by clothes drying in a few hours in Lawrence air, because taking the average amount of  $\text{SO}_3$  found after these sixteen days' exposure, it is clear that only .0052 gram of  $\text{SO}_3$  was absorbed each day. If the cloth had been washed with Lawrence tap water, leaving out of consideration any residual alkalinity from soap, etc., the alkalinity of the tap water on the damp cloth would have neutralized .0036 gram of  $\text{SO}_3$ , leaving only .0016 gram  $\text{SO}_3$  distributed over eighteen square feet of cloth.

Aside from these experiments, the best proof of the lack of danger to drying clothes in Lawrence is the fact that a cotton clothespin bag has been continuously exposed through many years to the elements near the Experiment Station without any sign of the effect of acid.

#### CHARACTER OF THE SEWAGE USED FOR INVESTIGATIONS UPON SEWAGE PURIFICATION AT THE LAWRENCE EXPERIMENT STATION

The sewage for the various filters, pumped to the Experiment Station through about 1,850 feet of pipe, is a fairly strong domestic sewage free from trade wastes and the coarser suspended matter is excluded by a strainer on the end of the pipe in the sewer.

The following tables present the average analyses of sewage used during the year. "Regular sewage" is the sewage as pumped to the Station; "settled sewage" is the same sewage after passing through Imhoff Tank No. 545 and receiving a slight additional settling in a large tank used for supplying all the filters at the Station, except Nos. 1, 4 and 9A which receive the effluent of Imhoff Tank No. 545.

#### IMHOFF TANK

One Imhoff tank was operated during the year. This tank is 20 feet deep, with a settling compartment 7 feet 4 inches long by 1 foot wide and with gas vents 1 foot square at each end. The bottom of the settling compartment has a slope of 45 degrees towards the center where there is a slot opening. This settling compartment has a capacity of 715 gallons and gives a theoretical storage or sedimentation period of one and one-half hours during the seven to eight hours that the sewage is being pumped. The digestion compartment has a capacity of 357 gallons.

Settleable solids were removed during the year at the rate of 316 pounds of dry matter per million gallons of sewage and the digested sludge, as drawn monthly was entirely inoffensive, black in color, contained an average of 5.4 per cent of dry matter and had a pH of around 7.0. The average composition of the dry sludge was,—fats, 15 per cent; nitrogen, 3.89 per cent; and loss on ignition, 61.2 per cent. Three hundred and ninety pounds of dry matter were withdrawn from the tank and 298 pounds were added. This tank would undoubtedly digest a much larger amount of fresh solids if they were available. Judging from laboratory experiments, Lawrence sludge as collected at the Station is more readily digested than sludges containing more carbonaceous vegetable matter, such as treated at most large Imhoff installations.

*Average Analyses*  
*Regular Sewage*  
[Parts in 100,000]

AMMONIA			KJELDAHL NITROGEN		Chlorine	Oxygen Consumed	Bacteria per Cubic Centimeter
Free	ALBUMINOID		Total	In Solution			
	Total	In Solution					
4.65	.88	.61	1.54	1.16	9.6	5.25	3,340,000
5.08	.73	.51	1.24	0.91	7.3	4.21	1,960,000
4.80	.68	.45	1.17	0.81	6.9	4.10	1,400,000

*Average Solids*  
*Regular Sewage*  
[Parts in 100,000]

UNFILTERED			FILTERED			IN SUSPENSION		
Total	Loss on Ignition	Fixed	Total	Loss on Ignition	Fixed	Total	Loss on Ignition	Fixed
57.8	30.4	27.4	44.3	21.0	23.3	13.5	9.4	4.1
51.5	23.3	28.2	41.8	17.9	23.9	9.7	5.4	4.3
49.3	25.2	24.1	42.3	20.0	22.3	7.0	5.2	1.8

OPERATION OF HOUSEHOLD SEPTIC TANKS

Two small septic tanks of concrete construction, Nos. 507 and 508, have been operated at the Station since June, 1920. The first is 4 feet long, 2 feet wide and 40 inches deep, with a sloping bottom and a capacity of 185 gallons; the second contains two compartments, each of the same size as the first tank. Sewage enters each tank through trapped inlets and discharges through a pipe reaching 15 inches below the surface of the sewage in the tank. A baffle is placed one-third of the distance from the inlet to the outlet and reaches to within eight inches of the bottom of the tank. The first tank receives fresh household sewage and the second, Lawrence sewage, a comparatively stale sewage. Both tanks are so operated that theoretically the sewage is held within each for two days; that is, the sewage added daily is equal to one-half the capacity of the tanks, disregarding the effect of the accumulated sludge. During most of the entire period of operation, the effluents from both tanks have been remarkably clear and comparatively odorless. Both tanks have been opened for observation and sludge measurements seven times since 1920, and the results have been given in previous reports. The sludge in both tanks has been practically odorless and has resembled good Imhoff tank sludge in appearance and analysis; in fact, these tanks behave more like Imhoff tanks than the usual septic tank. On November 17 the tanks were opened again for sludge measurements. Tank No. 507 contained 21½ inches of a very heavy sludge and no scum; the first compartment of Tank No. 508 contained 25½ inches, and the second, 12¾ inches of a somewhat less compact sludge and no scum.

Calculations showed that in two years 21.8 per cent of the organic matter deposited in Tank 507 had been destroyed and in Tank No. 508, 24.4 per cent. This is a somewhat lower proportion than formerly. It appears that at each successive opening of the tanks, the sludge has been of an increasingly stable character and it is possible that the biological processes which give stability tend to decrease the amount of organic matter destroyed. There has been little evidence of gas from these tanks for several years.

*Average Analyses*  
*Fresh Sewage applied to Closed Septic Tank No. 507*  
 [Parts in 100,000]

AMMONIA			KJELDAHL NITROGEN		Chlorine	Oxygen Consumed	Bacteria per Cubic Centimeter
Free	ALBUMINOID		Total	In Solution			
	Total	In Solution					
9.60	1.84	.87	3.32	1.62	7.8	8.76	3,150,000
Effluent from Closed Septic Tank No. 507							
7.23	0.82	.51	1.42	0.87	7.5	4.54	750,000
Regular Sewage applied to Closed Septic Tank No. 508							
4.45	0.95	.59	1.81	1.04	7.6	4.88	1,000,000
Effluent from Closed Septic Tank No. 508							
3.83	0.39	.30	0.70	0.53	7.3	2.52	640,000

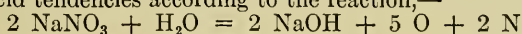
*Average Solids*  
*Fresh Sewage applied to Closed Septic Tank No. 507*  
 [Parts in 100,000]

UNFILTERED			FILTERED			IN SUSPENSION		
Total	Loss on Ignition	Fixed	Total	Loss on Ignition	Fixed	Total	Loss on Ignition	Fixed
82.3	52.6	29.7	48.9	23.8	25.1	33.4	28.8	4.6
<i>Effluent from Closed Septic Tank No. 507</i>								
51.7	24.3	27.4	41.3	17.0	24.3	10.4	7.3	3.1
<i>Regular Sewage applied to Closed Septic Tank No. 508</i>								
57.6	27.3	30.3	43.1	17.3	25.8	14.5	10.0	4.5
<i>Effluent from Closed Septic Tank No. 508</i>								
41.4	16.1	25.3	36.2	13.4	22.8	5.2	2.7	2.5

DIGESTION OF LAWRENCE SEWAGE SLUDGE WITH NITRIFIED SEWAGE FILTER EFFLUENT.— REDUCTION OF NITRATES IN EFFLUENT

One of the results of satisfactory filtration of sewage is the production of large amounts of nitrates. It is often desirable to reduce these nitrates before effluents containing them enter streams because nitrates, being food for microscopic organisms, may support such a growth as to create a nuisance. During the past three years a second study of nitrate reduction and digestion of sludge has been made, as described below, the first study of this kind at the Station being made from 1913 to 1916, inclusive.

The sludge removed from the settling tank supplying the Lawrence Experiment Station filters has been digested with a well-nitrified sewage filter effluent in Tank No. 483, this tank consisting of three compartments, 20 inches in diameter and 6 feet deep. The sludge collected three times a week was added to each compartment for two weeks in rotation, giving a maximum storage of six weeks. The filter effluent, containing 2.37 parts in 100,000 nitrates during the year, was applied continuously to the bottom of the first compartment, passing from the top of the first to the bottom of the second, and so on. The sludge used contained on an average only 1 per cent dry solids, hence the liquid portion was taken into account in calculating the loss of nitrogen from the effluent in passing through the tank. This loss was 24.1 per cent and there was probably also a loss of nitrogen from the sludge itself. During 1929 the period of digestion was twelve weeks and during 1930, eighteen weeks; during 1931, it was only six weeks and yet the results were practically as good as for the longer periods and the digested sludge compares favorably with the sludge from Imhoff Tank No. 545. Digestion is not entirely aerobic because the gas formed contains some methane but there are never any offensive odors. The sludge used contained 27.6 per cent fats and in six weeks this was reduced to 15.8 per cent. The average volume of effluent applied to the digestion tank during the year was 11.8 gallons for each gallon of sludge; the average relative stability of the overflow was 74. The addition of nitrified effluents to digesting sludge besides supplying available oxygen, furnishes alkalinity to correct any acid tendencies according to the reaction,—



and caustic soda combines with free carbon dioxide which is formed from the action of the oxygen on the carbonaceous matter.



## Average Analyses

*Effluent from Sand Filter applied to Sludge Digestion Tank No. 483*

[Parts in 100,000]

UNFILTERED			FILTERED			AMMONIA			NITROGEN AS	
Total	Loss on Ignition	Fixed	Total	Loss on Ignition	Fixed	Free	Albuminoid	In Solution	Nitrates	Nitrites
-	-	-	-	-	-	.56	.073	.057	2.37	.0067
<i>Effluent from Sludge Digestion Tank No. 483</i>										
39.4	13.5	25.9	34.9	11.5	23.4	2.09	.26	.14	0.64	.0437

It will be noted that nitrates in the effluent were reduced from 2.37 parts in 100,000 to .64 part.

## ACTIVATED SLUDGE

Experiments on the aeration and activation of sewage have been carried on at the Lawrence Experiment Station continuously since 1911 and descriptions and results of this work have been published in the annual reports of the Department. Activated sludge Tank No. 485, started in 1917, is still in operation. It consists of three compartments 75 inches deep, each holding 230 gallons. The overflow from the last compartment, which comprises the purified sewage and considerable sludge, passes through two settling tanks with capacities of 600 and 160 gallons, respectively, allowing about five and one-half hours' sedimentation during which the activated sludge settles out and is then pumped back to the first compartment. Air is applied at the bottom of each compartment through a filter plate clamped to the top of an iron box and at a rate approximating .33 cubic feet per hour per gallon of sewage. The tank is operated at the rate of 7,062,000 gallons per acre daily on the basis of the aerating and settling tanks, or 12,500,000 on the basis of the activating tanks alone. It has been the custom to retain about 20 per cent by volume of sludge in the tank, the excess being pumped to waste from time to time. During the year this surplus was at the rate of 217 pounds of dry sludge per million gallons of sewage treated. The sewage applied to this tank has been passed through an Imhoff tank and the supply tank. By this preliminary settling and the activated sludge process, 758 pounds of suspended solids per million gallons of sewage were removed. The dry activated sludge examined during the year contained 6.4 per cent nitrogen and 6.4 per cent fats. In all the various aeration tanks at the Experiment Station, aeration has been obtained by compressed air. However, aeration by mechanical means, usually by some paddle-wheel arrangement, has been carried on successfully at many places. There is as yet no agreement as to which method is more efficient and economical.

It was with some hesitation that experiments with mechanical aeration were started at Lawrence because all experiments here must necessarily be on a small scale and mechanical processes are not as well adapted to small scale experiments as are the usual filtration processes and operation with compressed air. After considerable study, however, a concrete tank\* was constructed, 7 feet 9 inches deep. This tank was 3 feet by 4 feet in area at the top but one side sloped at such an angle 15 inches from the top, that it was only 4 feet by 6 inches in area at the bottom. Just below the top of the tank was a trough of 6-inch radius in which revolved a four-blade paddle, each blade being 6 inches wide. A slot, 2 inches wide and built into the side of the tank, connected the bottom of the tank and the bottom of the circular trough. When the paddle was revolved, liquid in the trough was thrown over a low dividing wall into the main tank and as this liquid was removed, more flowed up through the slot from the bottom of the tank. At fifty revolutions a minute a good circulation of sewage was maintained and the surface of the liquid was well agitated. This tank was put in operation early in August with sludge from activated sludge Tank No. 485. After preliminary operation to ripen the sludge, regular operation was started on September 15. Sewage was applied on an average of twelve hours daily at the same rate as to activated sludge Tank No. 485 and the paddle was operated continuously. During normal operation the dissolved oxygen in the aerated sewage averaged .42 part in 100,000 or rather higher than in Tank No. 485. The effluent passes through two settling tanks and the sludge is pumped back from time to time. So far, the effluent has not been as good as that from Tank No. 485 and one reason is that sufficient sludge has not not yet been accumulated.

\*See article "Aeration as an Auxiliary to Trickling Filter Treatment," by G. M. Ridenour, Public Works, February, 1931.

## Average Analyses

Sewage applied to Activated Sludge Tank No. 485 and Mechanically Aerated  
Activated Sludge Tank No. 590

(Parts in 100,000)

APPEARANCE		AMMONIA			KJELDAHL NITROGEN		Chlorine	NITROGEN AS		Oxygen Consumed	Bacteria per Cubic Centimeter
Turbidity	Color	Free	Total	In Solution	Total	In Solution		Nitrates	Nitrites		
-	-	4.28	.90	.47	1.49	.84	7.1	-	-	4.86	1,400,000
<i>Effluent from Activated Sludge Tank No. 485</i>											
0.5	.53	1.93	.23	.16	0.42	.29	6.7	.78	.0715	1.46	500,000
<i>Effluent from Mechanically Aerated Activated Sludge Tank No. 590</i>											
0.4	.68	2.96	.36	.25	0.59	.44	8.0	.28	.0500	1.77	500,000

## Average Solids

Sewage applied to Activated Sludge Tank No. 485 and Mechanically Aerated  
Activated Sludge Tank No. 590

(Parts in 100,000)

UNFILTERED			FILTERED			IN SUSPENSION		
Total	Loss on Ignition	Fixed	Total	Loss on Ignition	Fixed	Total	Loss on Ignition	Fixed
55.5	30.5	25.0	40.4	19.1	21.3	15.1	11.4	3.7
<i>Effluent from Activated Sludge Tank No. 485</i>								
36.8	13.1	23.7	34.3	11.5	22.8	2.5	1.6	0.9

## OPERATION OF CONTACT FILTERS

Only one contact filter, No. 175, is now in operation as a study of the permanency of this type of filter and as an example of this method of sewage purification. It was started in 1901, is 1/20,000 of an acre in area and contains 39 inches in depth of coke passing a 1-inch screen and retained on a 1/4-inch screen. During 1931 it was operated one five-hour cycle daily with sewage which had passed through an Imhoff tank and received a small amount of settling in a storage supply tank. It was allowed to rest one week six times during the year. The effluent was well nitrified and always stable but contained rather more suspended matter than when the filtering material was cleaner. Since 1901 it has been necessary to remove and wash the filtering material twice, once in 1911 and again in 1920. Since this latter year the open space has decreased 29 per cent; during 1931 there was no further decrease.

## Average Analyses

## Effluent from Contact Filter No. 175

(Parts in 100,000)

QUANTITY APPLIED	AMMONIA			KJELDAHL NITROGEN	Chlorine	NITROGEN AS		Oxygen Consumed	Bacteria per Cubic Centimeter
	Free	Total	In Solu- tion			Nitrates	Nitrites		
Gallons per Acre Daily									
1,441,000	.33	.31	.19	.53	6.6	2.16	.0750	2.27	470,000

## Average Solids

## Effluent from Contact Filter No. 175

(Parts in 100,000)

UNFILTERED			FILTERED			IN SUSPENSION		
Total	Loss on Ignition	Fixed	Total	Loss on Ignition	Fixed	Total	Loss on Ignition	Fixed
47.5	27.8	19.7	40.4	23.5	16.9	7.1	4.3	2.8

## TRICKLING FILTERS

*Purification at Different Depths and Intervals between Dosings.—Pre-chlorination, Pre-activation and Pre-aeration of Sewage*

Trickling filters have been operated at the Experiment Station since 1890 and many different phases of this method of sewage purification have been investigated.

The question of the amount of purification taking place at different depths in such filters, investigated several years ago, was again taken up during the past two and one-half years. Along with this, the effect of different intervals between applications of sewage was also studied. Three filters, Nos. 571, 572 and 573, were started July 1, 1929. They are identical in construction (1/20,000 of an acre in area) and contain 10 feet in depth of crushed stone that will pass a 1½-inch screen and be retained by a ¾-inch screen. Filter No. 571 was dosed by a tipping basin device of the same size as regularly used at the Experiment Station, delivering about 360 cubic centimeters at each emptying. Filter No. 572 had a tipping basin of about half this size and Filter No. 573 was dosed with a siphon arrangement delivering about one-half gallon and requiring about a minute to drain. The average rate of each filter was 1,805,000 gallons per acre daily, giving dosing intervals of about 1.5, 0.6 and 8.2 minutes, respectively. At depths of 4, 6 and 8 feet, half-round sections of ¾-inch iron pipe are inserted, reaching to the center of each filter, to collect small portions of the effluent. These pipes slope slightly outward. The amount of effluent collected by these pipes is very small, and as these filters are made of Akron pipe with open joints, the effluent is returned to the filter at the next lower joint. This arrangement can have no appreciable effect on the operation of the filters as a whole.

The following table shows the amount of nitrification for each foot of material between the various outlets.

[Parts in 100,000]

DEPTH	NITROGEN AS NITRATES PER FOOT OF FILTER DEPTH		
	Filter No. 571	Filter No. 572	Filter No. 573
Surface to 4 feet . . . . .	.130	.173	.088
4 feet to 6 feet . . . . .	.210	.165	.170
6 feet to 8 feet . . . . .	.435	.190	.365
8 feet to 10 feet . . . . .	.215	.265	.065

If each of these nitrate figures is multiplied by the number of feet indicated, the total nitrification in the filter is shown; for example, in the case of Filter No. 571:—

$$\begin{aligned}
 .13 \times 4 &= .52 \\
 .21 \times 2 &= .42 \\
 .435 \times 2 &= .87 \\
 .215 \times 2 &= .43
 \end{aligned}$$

2.24 parts in 100,000 nitrates in effluent. (See also tables of results of Filters No. 571, 572 and 573 on following pages.)

This second table shows the decrease in soluble albuminoid ammonia, also a measure of purification, at the same depths.

[Parts in 100,000]

DEPTH	REMOVAL OF SOLUBLE ALBUMINOID AMMONIA BY THE FILTERING MATERIAL AT DIFFERENT DEPTHS		
	Filter No. 571	Filter No. 572	Filter No. 573
Surface to 4 feet . . . . .	.04	.01	.06
4 feet to 6 feet . . . . .	.07	.10	.03
6 feet to 8 feet . . . . .	.06	.03	.05
8 feet to 10 feet . . . . .	.01	.04	.05

These results do not show any uniformity between the three filters at any given depth. They do show, however, that the lower four feet of all three filters are as active in purification as the upper portions. Past experiments have shown that a further reason for the greater efficiency of deeper filters lies in the fact that sewage is more than proportionately longer in passing through deep filters than through shallow filters, allowing longer bacterial action. As a whole, there was little dif-



ference in the final effluents of these three filters due to methods of application of sewage. Nitrification and relative stability are somewhat lower in the effluent of the filter dosed the least frequently or at intervals of about 8.2 minutes. What little difference there was between the filter dosed at 1.5 and 0.6 minute intervals was in favor of the 1.5 minute interval.

Two new filters, Nos. 578 and 579, were started on March 26 and on April 1, respectively, and are of the same construction as Filters Nos. 571-573, inclusive. Filter No. 578 has received the settled effluent from the first compartment of activated sludge Tank No. 485 at an average rate of 3,473,000 gallons per acre daily. Filter No. 579 has received, at a rate of 1,830,000 gallons per acre daily, settled sewage to which 10 parts per million of free chlorine were added at least one hour before application to the filter. This amount of chlorine reduced the number of bacteria materially but never sterilized the sewage. This filter differs from Filter No. 571 only in the addition of chlorine. For the first three months of operation while the filter was maturing, the nitrites were unusually high. Continued operation will give a direct comparison with Filter No. 571 and show whether there is any advantage in pre-chlorinating the sewage. Filter No. 578 has also been operated too short a time after maturing to draw definite conclusions as to the value of treatment, for a short period only, of the applied sewage with activated sludge. A rate twice as high as that of Filters Nos. 571-573, inclusive, was maintained but it is hoped to perhaps double that rate later.

Ten other trickling filters were operated during the year. The oldest, No. 135, containing 10 feet in depth of walnut-size stone, has been in operation thirty-two years. Filters Nos. 452-455, inclusive, contain 4, 6, 8 and 10 feet, respectively, of crushed stone that will pass a  $1\frac{1}{2}$ -inch screen and be retained by a  $\frac{3}{4}$ -inch screen. Filters Nos. 473-475, inclusive, contain 6, 8 and 10 feet, respectively, of coarser stone, passing a  $2\frac{1}{2}$ -inch to a 3-inch screen and retained by a  $1\frac{1}{2}$ -inch screen.

Filter No. 452 received sewage that was aerated without contact with activated sludge and contained up to .5 part in 100,000 dissolved oxygen when applied to the filter. This preliminary treatment allowed a rate per foot of material nearly as high as that of a ten-foot filter. Filters Nos. 453, 454 and 455 were operated at rates of 128,000, 228,000 and 385,000 gallons per acre daily per foot of depth of material and gave effluents of approximately equal quality. This illustrates the advantages of the deeper filters. If these rates were increased 25 or 50 per cent, the stability of the effluents would be decreased but the deeper filters would be less affected. The same relation between depth and rate held for Filters Nos. 473-475, inclusive.

#### Average Analyses

Effluents from Trickling Filters Nos. 135, 452, 453, 454, 455, 473, 474 and 475  
[Parts in 100,000]

FILTER NUMBER	Quantity Applied — Gallons per Acre Daily	AMMONIA				Kjeldahl Nitrogen	Chlorine	NITROGEN AS —		Oxygen consumed	Bacteria per Cubic Centimeter
		Free	ALBUMINOID		Nitrates			Nitrites			
			Total	In So- lution							
135	1,441,000	1.13	.38	.22	0.65	6.9	1.93	.0238	2.77	470,000	
452	1,441,000	2.05	.67	.38	1.12	7.2	1.50	.0387	3.72	190,000	
453	769,000	1.70	.45	.28	0.73	7.2	1.25	.0238	2.94	175,000	
454	1,822,000	1.73	.37	.23	0.65	7.1	1.39	.0258	2.36	390,000	
455	3,853,000	1.68	.41	.23	0.72	6.8	1.41	.0313	2.49	440,000	
473	577,000	1.60	.38	.22	0.67	7.0	1.31	.0385	2.45	200,000	
474	1,559,000	1.85	.46	.23	0.81	7.0	1.29	.0475	2.41	250,000	
475	3,071,000	1.58	.46	.22	0.74	6.9	1.30	.0338	2.63	520,000	

#### Average Solids

Effluents from Trickling Filters Nos. 135, 452, 453, 454, 455, 473, 474 and 475  
[Parts in 100,000]

FILTER NUMBER	UNFILTERED			FILTERED			IN SUSPENSION		
	Total	Loss on Ignition	Fixed	Total	Loss on Ignition	Fixed	Total	Loss on Ignition	Fixed
135	49.0	23.3	25.7	41.8	19.1	22.7	7.2	4.3	3.0
452	54.3	27.2	27.1	40.6	18.2	22.4	13.7	9.0	4.7
453	51.6	21.6	30.0	40.1	13.9	26.2	11.5	7.7	3.8
454	44.3	18.8	25.5	37.9	14.7	23.2	6.4	4.1	2.3
455	46.3	20.6	25.7	36.9	15.1	21.8	9.4	5.5	3.9
473	43.9	17.9	26.0	35.8	13.9	21.9	8.1	4.0	4.1
474	44.5	18.0	26.5	37.2	13.8	23.4	7.3	4.2	3.1
475	45.8	19.9	25.9	36.7	13.5	23.2	9.1	6.4	2.7

## Average Analyses

Effluents from Trickling Filters Nos. 571, 572 and 573 collected at Different Depths

## Filter No. 571

[Parts in 100,000]

Depth (Feet)	AMMONIA			Kjeldahl Nitrogen	Chlorine	NITROGEN AS —		Oxygen con- sumed	Bacteria per Cubic Centi- meter
	Free	ALBUMINOID				Nitrates	Nitrites		
		Total	In Solu- tion						
4	3.88	.71	.41	1.35	6.9	0.52	.0413	3.85	1,900,000
6	3.08	.64	.34	1.14	6.9	0.94	.0421	3.65	1,020,000
8	2.67	.61	.28	1.15	6.9	1.81	.0393	3.72	1,010,000
10	2.71	.60	.27	1.14	6.9	2.24	.0323	3.72	510,000

## Filter No. 572

4	3.17	.75	.44	1.37	6.9	0.69	.0449	3.92	1,180,000
6	2.93	.70	.35	1.27	7.0	1.02	.0423	3.79	1,050,000
8	2.93	.73	.32	1.34	7.0	1.40	.0438	3.80	1,080,000
10	2.24	.64	.28	1.26	6.7	1.92	.0339	3.49	1,330,000

## Filter No. 573

4	3.41	.57	.39	1.04	7.0	0.35	.0505	3.29	1,350,000
6	3.18	.62	.36	1.14	6.9	0.69	.0496	3.52	940,000
8	2.64	.59	.31	1.11	6.9	1.42	.0363	3.25	1,080,000
10	2.71	.65	.28	1.20	6.8	1.55	.0444	3.48	1,400,000

## Average Analyses

Sewage applied to and Effluents from Trickling Filters Nos. 578 and 579

[Parts in 100,000]

FILTER NUMBER	AMMONIA			Kjeldahl Nitrogen		Chlorine	NITROGEN AS—		Oxygen Consumed	Bacteria per Cubic Centimeter
	Free	ALBUMINOID		Total	In Solu- tion		Nitrates	Nitrites		
		Total	In So- lution							
Applied, No. 578	2.90	.58	.29	1.03	.57	7.6	0.20	.0622	2.85	1,180,000
Effluent, No. 578	1.69	.36	.19	0.65	-	7.5	1.08	.0814	2.28	580,000
Applied, No. 579	3.68	.61	.38	1.08	.70	14.5	-	-	3.30	20,200
Effluent, No. 579	2.60	.63	.31	1.08	-	14.6	0.57	.6150	4.11	475,000

Table showing Average Relative Stabilities

Filter Number	Relative Stability	Filter Number	Relative Stability
135	99+	571, 4 feet	43
175	96	6 "	62
452	97	8 "	99+
453	98	10 "	99+
454	99+	572, 4 "	31
455	99+	6 "	67
473	91	8 "	89
474	89	10 "	99+
475	99	573, 4 "	34
483	74	6 "	61
485	99+	8 "	90
		10 "	91

## INTERMITTENT SAND FILTERS OPERATED WITH UNTREATED SEWAGE

## Filters Nos. 1, 4 and 9A

Each of these filters is 1/200 of an acre in area and at the end of the year Nos. 1 and 4 had been operated forty-four years and No. 9A forty-one years. Up to January, 1926, they received regular sewage without preliminary settling but for the last six years the sewage applied has been passed through an Imhoff tank where some suspended solids have been removed. Filters Nos. 1, 4 and 9A were operated at rates of 41,900, 19,300 and 47,200 gallons per acre daily, respectively, during 1931. For many years there has been but little increase in the amount of organic matter stored in the filters.

Filter No. 1 contains 5 feet in depth of sand of an effective size of .48 millimeter; Filter No. 4, 5 feet in depth of sand of an effective size of .04 millimeter and Filter

No. 9A, 5 feet in depth of sand of an effective size of .17 millimeter. The surface of Filter No. 4 is permanently arranged in circular trenches, 14 inches wide, which are filled to a depth of 12 inches with sand of an effective size of .48 millimeter. Sewage is applied to these trenches, grass being allowed to grow on the ridges. The surface of Filters Nos. 1 and 9A are trenched and ridged late in the fall, board coverings being placed over these trenches and the trenches on Filter No. 4 to help prevent the surface from freezing.

The effluents of these filters have been quite acid for many years due to the presence of free nitric acid, there not being sufficient alkali in the sewage for complete neutralization. In the earlier years of operation this deficiency was made up by alkali extracted from the sand but now this supply has been exhausted, hence beginning the first of the year, sufficient soda ash was added to the sewage to increase the alkalinity 8 parts in 100,000; but for some unexplained reason only part of this added alkalinity has apparently appeared in the effluent. The average acidity of the effluent of Filter No. 1 in 1930 was 2.4 parts in 100,000; in 1931, .5 part,—a reduction of only 1.9 parts in 100,000, where it should have been about 5.6 parts alkaline, theoretically. Late in the year the amount of soda was doubled. So far the addition of soda has been without appreciable effect but a definite conclusion in regard to its effectiveness can only be reached when sufficient alkalinity is added to neutralize all the acid all the time.

*Average Analyses*  
*Effluent from Filter No. 1*  
[Parts in 100,000]

TEMPERATURE (DEGREES F.)		AMMONIA		Chlorine	NITROGEN AS—		Oxygen Consumed	Alkalinity	Bacteria per Cubic Centimeter
Applied	Effluent	Free	Albumi- noid		Nitrates	Nitrites			
56	51	.8272	.0827	6.7	3.07	.0011	.75	-0.5	33,000
<i>Effluent from Filter No. 4</i>									
56	51	.1432	.0285	6.0	3.34	.0060	.42	-2.4	1,310
<i>Effluent from Filter No. 9A</i>									
56	52	.5539	.0512	5.5	3.06	.0008	.73	0.1	16,200

PURIFICATION OF WATER BY STORAGE

Storage of water in lakes and reservoirs in Massachusetts has long been recognized as playing an important part in its purification. The most noticeable effect of storage is in the bleaching of the color by sunlight but of more importance is the reduction or even complete elimination of pathogenic bacteria. Non-pathogenic bacteria are also reduced in numbers. Undoubtedly, lack of food and generally unfavorable conditions for bacterial life are more effective in causing bacterial decrease than sunlight as this decrease occurs in covered as well as in open reservoirs. In 1902 some experiments were made at the Experiment Station with a tank 12 feet deep, through which the highly polluted Merrimack River water was passed at such a rate that twenty days' storage was obtained. Elimination of *B. coli* ranged from 80 to 100 per cent. The effect on other types of bacteria was not determined. Other data collected at that time showed that over a five-year period, the number of *B. coli* in the filtered Lawrence supply was reduced about 50 per cent by ten to twelve days' storage in the distributing reservoir of the city. In 1930 a study of the effect of storage on the highly polluted Merrimack River water was started on a larger scale than the earlier work. Two covered concrete tanks, 16 feet in diameter and holding 3 feet 9 inches of water, were used. A small door diffused light to enter during the warmer months but during the winter the door was closed. The first tank was divided by concrete walls into three sections, one about twice as large as the other two; the second tank was divided into four equal sections and these seven compartments were connected in series, the inlet in each case being at the bottom and the outlet near the top. River water flowed through continuously at such a rate that it was at first twenty-five days



passing through the two tanks. Later the storage was extended to forty-five days. Twenty-five days' storage reduced *B. coli* from 750 in 100 cubic centimeters to 11 in 100 cubic centimeters,—a reduction of 98.53 per cent while forty-five days' storage reduced *B. coli* from 2,500 in 100 cubic centimeters to 0.5 in 100 cubic centimeters,—a reduction of 99.98+ per cent. Water after storage was applied to a sand filter, No. 577, at a rate of 2,500,000 gallons per acre daily. This filter, 4 feet in depth of sand of an effective size of .25 millimeter, reduced the *B. coli* of the applied water from 11 in 100 cubic centimeters to 3 in 100 cubic centimeters when water stored for twenty-five days was being used but did not improve the water bacterially when water stored for forty-five days was being applied. Past experience has shown, of course, that filtration of clear water, containing practically no matter in suspension, accomplishes little in this respect. A second filter, a duplicate of Filter No. 577, was operated with raw river water such as entered the storage tank and also at a rate of 2,500,000 gallons per acre daily, but failed with this highly polluted river water to cause as good *B. coli* reduction as storage for twenty-five days and gave results much poorer than obtained by forty-five days' storage. The effluent of this filter contained 22 *B. coli* in 100 cubic centimeters as an average.

#### Average Bacterial Analyses

	BACTERIA PER CUBIC CENTIMETER			B. Coli in 100 cc.
	4 Days 20°C	24 Hrs. — Total	37°C Red	
First Period:				
River water before storage . . . . .	2,550	119	59	750
River water after 25 days' storage . . . . .	—	33	2	11
Second Period:				
River water before storage . . . . .	2,250	153	45	2,500
River water after 45 days' storage . . . . .	264	5	0	0.5
Effluent of Filter No. 577:				
First Period . . . . .	—	22	1	— 3
Second Period . . . . .	256	11	1	1
Effluent of Filter No. 576:				
First Period . . . . .	143	9	2	21
Second Period . . . . .	220	12	1	23

#### Average Chemical Analyses

[Parts in 100,000]

	Color	AMMONIA			Chlorine	NITROGEN AS—		Oxygen Consumed	Hardness
		Free	ALBUMINOID			Nitrates	Nitrites		
			Total	In So- lution					
Stored river water applied to Filter No. 577	.44	.0078	.0156	.0133	.45	.042	.0002	.49	5.8
Effluent from Filter No. 577	.39	.0034	.0120	—	.45	.048	.0001	.46	5.7
Raw river water applied to Filter No. 576	.43	.0193	.0239	.0189	.48	.024	.0015	.65	1.8
Effluent from Filter No. 576	.31	.0046	.0138	—	.48	.032	.0008	.51	1.8

#### LAWRENCE CITY FILTERS

As usual this report presents data in regard to the operation during the past year of the slow sand filters for the purification of the water supply of Lawrence. Lawrence has taken its water supply from the Merrimack River since 1875 and since 1893 it has been filtered. Since 1918 the filtered water has been treated with chlorine as an added factor of safety. Three filters are in use. The oldest, 2.2 acres in area, is divided into three sections, one of which is covered; the second, 0.75 of an acre in area was built in 1907 and is also covered; the third filter, covered also, was completed early in 1926 and is 0.75 of an acre in area. The average volume of water filtered daily during 1931 was 4,611,000 gallons. Liquid chlorine was applied as a solution at the pump-well at an average rate of 1.58 parts in 1,000,000. This amount of chlorine is very high compared with what is used at other filter plants but has proved to be necessary. The bacterial removal by the various filters is generally over 99 per cent but the remaining bacteria, which are comparatively few in number, appear to require more chlorine for their destruction than would normally be expected.

No attempt is made to maintain any definite residual chlorine as daily samoles for bacterial analysis are taken of the water after chlorination and the amount of chlorine to be added is governed by the bacterial efficiency found. The chlorinated water is pumped directly to a storage reservoir holding about 41,000,000 gallons and normally any excess chlorine is taken care of in the reservoir. Late in the year (1931) a pump was installed to pump water directly from the reservoir to the stand-pipe used for the high service supply of the city. Formerly, water for the high service was taken from the same pump-well at the filters as the low service and this arrangement made it impossible to adjust the chlorine properly to the high and low service supplies.

The iron in Lawrence water has been very high for a surface water for many years, due to the leakage of ground water (high in iron) into the underdrains of some of the filters. The effluents of the west covered and north covered filters have always been low in iron but springs were encountered in the construction of the first or "old" filter (1893) especially at its east end in what is now called the east covered filter. The east filter, so called, has a concrete bottom but much ground water enters through it. The two open sections of the old (1893) filter have earth bottoms. During 1931 samples were examined weekly from these three sections for iron. The average found in the effluent of the east covered section was .2300; of the east open section, .1770; and of the west open section, .0700 part in 100,000; and the average of monthly samples of the combined effluent of the three sections was .1798.

### Average Bacterial Analyses

#### Merrimack River—Intake of the Lawrence City Filters

BACTERIA PER CUBIC CENTIMETER			PER CENT OF BACTERIA REMOVED			PER CENT OF SAMPLES CONTAINING B. COLI					B. Coli in 100 cc
4 Days 20°C.	24 Hrs.—37°C.		4 Days 20°C.	24 Hrs.—37°C.		.001 cc.	.01 cc.	0.1 cc.	1.0 cc.	10 cc.	
Total	Red		Total	Red							
6,300	280	110	—	—	—	0	48	94	100	100	5,200
<i>Effluent from the Lawrence City Filter (Old Filter, East Open Section)</i>											
53	5	1	99.2	98.2	99.1	—	—	0	5	18	7
<i>Effluent from the Lawrence City Filter (Old Filter, East Covered Section)</i>											
44	4	0	99.3	98.6	100.0	—	—	0	4	27	6
<i>Effluent from the Lawrence City Filter (Old Filter, West Open Section)</i>											
64	6	1	99.0	97.9	99.1	—	—	0	7	36	11
<i>Effluent from the Lawrence City Filter (North Filter)</i>											
40	4	1	99.4	98.6	99.1	—	—	0	7	37	11
<i>Mixed Effluents as pumped to the Distributing Reservoir after Chlorine Treatment</i>											
13	2	0	99.8	99.3	100.0	—	—	0	0	—*	—*
<i>Water from the Outlet of the Distributing Reservoir</i>											
36	3	0	99.4	98.9	100.0	—	—	0	0	2	—*
<i>Water from a Tap at Lawrence City Hall</i>											
40	2	0	99.4	99.3	100.0	—	—	0	0	0	0
<i>Water from a Tap at the Lawrence Experiment Station</i>											
40	3	0	99.4	98.9	100.0	—	—	0	0	2	—*
<i>Water from a Tap on the High Service System</i>											
39	3	0	98.4	98.9	100.0	—	—	0	0	2	—*

\*Less than 1.

*Average Chemical Analyses*  
*Merrimack River—Intake of the Lawrence City Filters*  
 [Parts in 100,000]

Temperature (Deg. F.)	APPEARANCE		AMMONIA			Chlorine	NITROGEN AS —		Oxygen Consumed	Iron	Hardness
	Turbidity	Color	Free	ALBUMINOID			Nitrates	Nitrites			
				Total	In So- lution						
50	0.2	.47	.0253	.0232	.0182	.43	.022	.0011	.61	.0646	1.7
Effluent from the Lawrence City Filter (Old East Filter)											
50	0.1-	.49	.0225	.0114	-	.49	.037	.0003	.49	.1798	2.2
Effluent from the Lawrence City Filter (North Filter)											
50	0.0	.26	.0058	.0110	-	.48	.042	.0003	.48	.0423	1.8
Water from the Outlet of the Distributing Reservoir											
50	0.0	.38	.0110	.0112	-	.61	.041	.0001	.45	.1095	1.9
Water from a Tap at Lawrence City Hall											
52	0.0	.35	.0106	.0114	-	.60	.041	.0002	.40	.1168	2.1
Water from a Tap at the Lawrence Experiment Station											
51	0.0	.36	.0099	.0103	-	.61	.043	.0001	.40	.1149	2.1

AVERAGE SOLIDS  
*Merrimack River—Intake of the Lawrence City Filters*  
 [Parts in 100,000]

UNFILTERED			FILTERED			IN SUSPENSION		
Total	Loss on Ignition	Fixed	Total	Loss on Ignition	Fixed	Total	Loss on Ignition	Fixed
6.13	2.47	3.66	5.62	2.22	3.40	.51	.25	.26
<i>Effluent from the Lawrence City Filter (Old East Filter)</i>								
6.71	2.45	4.26	-	-	-	-	-	-
<i>Effluent from the Lawrence City Filter (North Filter)</i>								
5.82	2.28	3.54	-	-	-	-	-	-
<i>Water from the Outlet of the Distributing Reservoir</i>								
6.08	2.23	3.85	-	-	-	-	-	-
<i>Water from a Tap at Lawrence City Hall</i>								
6.07	2.15	3.92	-	-	-	-	-	-
<i>Water from a Tap at the Lawrence Experiment Station</i>								
6.24	2.13	4.11	-	-	-	-	-	-

COLOR REMOVAL FILTERS

The color removal filters, fully described in previous reports, have been continued in operation and the results are summarized in the following table.

*Data on Operation of Color Removal Filters since Beginning of Operation*

Filter Number	Year Started	AVERAGE GRAINS PER GALLON OF WATER FILTERED		Number of Times Treated with NaOH	Average Number of Days Between Treatments	Average Color
		Caustic Soda	Ferric or Aluminum Sulphate			
River water	-	-	-	-	-	.40
488	1917	.40	.045	71	64	.15
494	1918	.37*	.054	68	51	.16
496	1918	.12	.018	19	217	.08
535	1929	.26	.24	6	126	.14
536	1924	.29	.091	27	78	.15
563	1928	.24	.35	9	119	.12
564	1928	.24	.35	9	119	.12
565	1928	.24	.35	9	119	.12
566	1928	.24	.35	9	119	.14

\*Aluminum Sulphate.



## MINERAL ANALYSES

During the past year and one-half, thirty-one mineral analyses have been made of certain waters of the State, these supplies including twenty-four surface waters and seven ground waters. The following table gives the results obtained.

[Parts in 100,000]

CITY OR TOWN	SiO <sub>2</sub>	Fe	Ca	Mg	Na	K	SO <sub>4</sub>	HCO <sub>3</sub>	Cl	NO <sub>3</sub>	Solids		
											Total	Loss	Fixed
Attleboro*	0.4460	0.004	1.3090	0.1900	0.3433	0.0786	1.6260	1.59	0.55	.033	5.25	1.50	3.75
Beverly	0.4340	0.022	1.4230	0.2986	0.6824	0.1230	2.1730	2.56	1.08	.066	8.85	1.50	6.40
Brookton	0.3780	0.007	0.2107	0.0900	0.4089	0.1200	0.6500	0.85	0.74	.000	3.60	1.50	2.10
Brookline*	1.4130	0.205	2.7420	0.4320	0.9590	0.1508	2.8670	4.88	1.04	.146	12.80	2.50	10.30
Cambridge	0.3755	0.012	1.4720	0.2500	0.5543	0.1797	2.6420	2.19	0.74	.111	9.10	2.75	6.35
Chicopee	0.9360	0.010	0.6370	0.0642	0.2700	0.0603	0.6000	1.83	0.32	.252	4.85	1.75	3.10
Fall River	0.1690	0.014	0.2959	0.0688	0.4038	0.0771	1.0830	0.85	0.64	.000	3.95	1.40	2.55
Fitchburg	0.3020	0.020	0.3030	0.0627	0.2116	0.0810	0.9240	0.98	0.20	.009	3.50	1.30	2.20
Frammingham	0.2350	0.020	0.4717	0.0399	0.3474	0.1023	0.9650	1.46	0.30	.009	4.00	1.35	2.65
Gloucester	0.2780	0.038	0.2667	0.1348	0.5655	0.2731	1.1310	2.07	0.56	.111	5.95	2.05	3.90
Haverhill	0.0790	0.009	0.9770	0.1367	0.3540	0.0545	0.7597	2.20	0.27	.009	4.75	1.40	3.35
Holyoke	0.6130	0.009	0.6764	0.1442	0.1808	0.0545	1.0100	1.83	0.66	.111	5.50	2.60	2.90
Lawrence	0.6290	0.057	0.5976	0.0900	0.4060	0.2396	1.3110	0.98	0.25	.013	5.95	2.20	3.75
Leominster	0.7180	0.018	0.4812	0.0767	0.2870	0.0739	0.8345	4.27	0.87	.097	12.40	4.40	8.00
Lowell*	1.0600	0.420	1.1660	0.1211	0.5675	0.2497	1.3110	1.95	0.81	.013	7.55	2.60	4.95
Lynn	0.4290	0.034	0.8720	0.3330	0.5164	0.1012	1.6390	3.05	0.70	.155	8.60	3.15	5.45
Metropoitan	1.2240	0.065	1.6120	0.1145	0.4420	0.2392	0.9900	1.59	0.32	.031	4.30	1.60	2.70
New Bedford	0.2120	0.012	0.4360	0.1046	0.3942	**	0.9850	1.22	0.62	.097	10.80	2.40	8.35
Newton*	0.2230	0.016	0.3410	0.1114	0.4183	0.0968	1.0180	2.68	0.92	.000	4.30	1.50	2.80
North Adams	1.0800	0.016	1.1640	0.2800	0.6224	0.1175	1.8140	2.32	0.12	.000	4.20	1.60	2.60
Northampton	0.4570	0.005	0.6861	0.1255	0.1341	0.0772	0.7190	2.68	0.24	.009	5.05	1.55	3.50
Northampton	0.6540	0.010	0.9425	0.1215	0.1716	0.0855	0.6925	1.34	0.49	.027	4.90	1.50	3.40
North Andover	0.1760	0.022	0.5853	0.1408	0.4710	**	1.3730	1.71	1.02	.280	8.10	2.20	5.90
Peabody	0.6800	0.020	0.8075	0.3245	0.4968	0.0957	1.5830	4.88	0.24	.009	6.65	2.00	4.65
Pittsfield	0.3550	0.013	1.6410	0.4705	0.0957	0.2337	0.9697	1.71	1.15	.015	1.75	2.50	4.25
Springfield	0.3560	0.012	0.5156	0.1201	0.2002	0.0965	1.0550	1.22	0.15	.009	3.25	1.40	1.85
Taunton	1.1590	0.017	0.2023	0.0852	0.3852	0.0855	0.7650	0.73	0.45	.199	5.30	1.25	4.05
Walpole*	0.1900	0.008	0.5560	0.1459	0.4502	**	0.7700	2.32	0.49	.210	9.65	2.30	7.35
Waltham*	0.8360	0.003	1.8520	0.3523	0.4345	0.3094	2.4700	2.93	0.61	.009	5.60	2.25	3.35
Weymouth	0.4670	0.030	0.3853	0.1472	0.3223	0.1191	1.3600	0.73	0.82	.000	2.95	1.00	1.95
Worcester	0.2375	0.011	0.3403	0.0592	0.3275	0.1001	0.8080	0.85	0.19	.000			

\*\*Na+K as Na.

\*Ground water.

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# EIGHTEENTH ANNUAL REPORT

OF THE

## DEPARTMENT OF PUBLIC HEALTH OF MASSACHUSETTS

### REPORT OF THE PUBLIC HEALTH COUNCIL

At the end of the fiscal year closing November 30, 1932, the Department of Public Health was constituted as follows:

Commissioner of Public Health . . . . . GEORGE H. BIGELOW, M.D.

#### PUBLIC HEALTH COUNCIL

GORDON HUTCHINS, 1934

SYLVESTER E. RYAN, M.D., 1934

FRANCIS H. LALLY, M.D., 1933

RICHARD P. STRONG, M.D., 1935

ROGER I. LEE, M.D., 1933

JAMES L. TIGHE, B.A.Sc., C.E., 1935

During the year twelve formal meetings of the Department were held, which included the regular monthly meetings, the November meeting being combined with a visit to the industrial sections of Everett and Chelsea which were under investigation as directed by Chapter 40 of the Resolves of 1932.

The Committee on Sanitary Engineering, composed of Mr. Tighe, Chairman, Mr. Hutchins and Dr. Bigelow, has given invaluable service, meeting regularly prior to the monthly meeting of the Council to consider the many and diverse sanitary matters before the Department and submitting to the Council suitable recommendations on the same.

The Council has held hearings on various matters as required by statute, has promulgated and revised regulations as experience indicated, has approved appointments submitted by the Commissioner, and has considered, advised and promulgated policies on the various matters coming within the scope of the Department.

As already mentioned, the Department was directed by Chapter 40 of the Resolves of 1932 to study the effect upon "the public health and comfort" of the emanations from the various industries of Everett and Chelsea. This has been done as exhaustively as the time permitted and a report has been duly submitted to the Legislature.

At a meeting of the Department on January 17, 1933, the Commissioner of Public Health presented to the Council a report of the activities of the Department for the year 1932, and after discussion it was voted that this report, together with the foregoing brief summary of the doings of the Public Health Council, be approved and adopted as the report of the Department of Public Health for the year 1932.

## EIGHTEENTH ANNUAL REPORT OF THE COMMISSIONER OF PUBLIC HEALTH

### *To the Public Health Council:*

GENTLEMEN: I have the honor to submit herewith my annual report for the fiscal year ending November 30, 1932, although, as in the past, all figures except those relating to the budget will be given for the calendar year.

In viewing the year in immediate retrospect there are certain matters that stand out, though they vary widely in prominence and importance. It is becoming increasingly clear to me that in general the more far reaching a matter is, the less momentary clamor it makes. The ephemeral is apt to be forensic, the eternal silent.

Although the economic situation continues unfavorable, superficially the general health of the people is favorable; and, therefore, there is danger of unwarranted smugness, as I shall discuss later. The sincere demands for nutritional advice from welfare agencies, public and private, food merchants and the general public is the most heartening aspect of this situation. If as static a thing as the dietary habits of a people can be improved under the present duress, a great advance in the future bodily integrity of the people may result. Out of the Governor's Massachusetts Committee on the White House Conference on Child Health and Protection has come the permanent Massachusetts Child Council, under the inspired leadership of Mr. Herbert Parsons and devoted to the interests of the whole child, educational, social, recreational, penological, mental and physical. At this time when worse than spending inadequate funds to protect our young is spending what we have stupidly, the creation of such a Council is unbelievably opportune. Through meetings between the Public Health Council and the Public Relations Committee of the Massachusetts Medical Society, a fine mutual understanding has been inaugurated and machinery for future conferences and advice has been created. The Department stands eager to help in any way possible the postgraduate medical educational program which was the most significant recommendation of that committee. Although still resented by some local health officials, the newly created Milk Regulation Board, composed of the Attorney General and the Commissioners of Agriculture and Health, should prove a most significant factor in the confused field of dairying with its diverse health and economic aspects. If the Board continues on the same disinterested plane, it should go far toward showing that the producing and supervising and consuming interests are essentially one, and a great war will have given way to a constructive peace. Many of the acute communicable diseases have shown unusually low incidence, such as infantile paralysis, influenza, diphtheria, typhoid fever, lobar pneumonia, meningitis, measles and rabies. Scarlet fever is the outstanding exception. Fitchburg, with 60 cases of smallpox last winter, set an example of administrative effectiveness to the entire country by vaccinating in one week more than 100 per cent of its registered population through reaching students and factory workers from out of town. In a field diffuse with therapeutic opinions, agreement has been reached among a wide, substantial group as to Minimum Standards for Clinics Treating Gonorrhea and Syphilis and these are ready for approval. The profound advantage through improved service to groupings of small communities into Health Districts has made real progress in Southern Berkshire and Nashoba and will stand as a lasting memorial to the vision of the many members of the many boards of health involved. This work, as well as the pneumonia study and service, and certain tuberculosis and cancer studies, is made possible through grants from the Commonwealth Fund of New York City and the Rockefeller Foundation. Such Foundations are unique to this country and should hearten us in the presence of unique venality. For diphtheria immunization among preschool children, we are ready to distribute toxoid, while continuing, temporarily at least, toxin-antitoxin for those whose parents have delayed protecting till they enter school. "Cured Cancer Clinics," filled with patients known to have had the disease and yet who had gone from four to forty years after treatment, were offered to all physicians and dentists in the State in six Boston hospitals and the two dental school clinics last winter. These and the public meetings connected with them were perhaps the culmination of five



intensive years of cancer service and education, and there is evidence from hospital attendance and lessened death rates that it all has not been in vain. That through conscious effort there should be lessened cancer in Massachusetts as well as vastly lessened suffering is more than the most hardy would have dared to expect. The vast material on cancer and other chronic diseases in Massachusetts collected over three years and tabulated over one is ready for publication. Finally, three significant figures in public health in Massachusetts have died this year: Dr. Henry Pickering Walcott who for thirty-three years served illuminatingly on the State Board of Health in addition to his other intellectually diversified activities; Dr. William L. Richardson, who in the early days of the Board (1876) wrote a most comprehensive summary of its first seven years (when reading it one wonders if what we say today will as well stand the test of time, or with our boasted knowledge is our average of inaccuracies higher); and Mr. G. Webster Hallett, the father of the Barnstable County Health Department, who for years and in many fields pointed the way of good citizenship. A State that has produced such men as these must be dissatisfied with mediocrity.

### I. GENERAL MATTERS

*The Effect of the Depression.* — It is generally recognized that the scars of these times will be carried longer by our children than anything else in our civilization. During the later years of the war, particularly in the Central European Empires, when fats were almost entirely withdrawn from the dietary, tuberculosis found a fertile field, as did the large group of deficiency diseases. We are now in the fourth year of the depression, though in certain of our textile cities it was an old story in 1929. Are there no ill effects? Or are we too blind to see them? How can officials talk so eternally about the healthiness of it all with so much worry and insecurity abroad and so many empty or inadequately filled bellies.

It is, of course, recognized that moderation is the essence of personal hygiene — moderation in eating, dissipation, stimulants, work, worry, play, exercise and even good works. The depression has perforce prevented much immoderation which, during the preceding decade of "normalcy," one did not have to go far to see. So far so good, and we are probably reaping the immediate benefits. However, the dissolutions of stringency and existence at sub-sustenance levels may eclipse the ravages of dissipation and gluttony if given time enough and enough of our people on whom to work, particularly our children. Jangled nerves, interminable insecurity, hunger, cold, dampness, who has the temerity to say that the cumulation will not bring forth a foul crop of suicide, disease and death?

We must produce a simple measuring rod and this, at the suggestion of Dr. Harold Stuart, we hope to do by comparing the average annual gain in weight of a given class in school now with the gain of the same class before the depression. But whether we can detect change or not we must bend our efforts particularly toward maintaining the nutrition of the critically sensitive infants and pre-school children. And nutrition must be recognized as including, besides a balanced diet adequate in amount, sufficient rest and the correction of physical defects.

*The Balanced Diet.* — If one can have but one dish let it be whole cereal bread and milk. If possible, add fruit and green vegetables. (The nutritionists have mercifully simplified their advice!) Then there should be added, of course, the other dairy products, fats, sweets and proteins. But the importance of the fundamentals must be impressed!

For the first time, public welfare departments are asking advice. We developed a technique in helping Fall River, and we are giving of this experience to all others. The County Extension Service, the home economics workers, the Dairy and Food Council, the wholesale grocers and chain stores, the private welfare agencies, public health nurses, social workers, school teachers, mayors, aldermen — all seem to have suddenly heard the call of the Pied Piper of nutrition and realize that even the New England diet should have something besides meat, potato and pie. Of enormous benefit if it really goes!

Yet we find from a recent study that the per capita consumption of milk has fallen 10 per cent over three years ago. With milk (that is safe milk) our most important single article of food, all possible support must be enlisted to stem the tide of dietary deprivation.

*The Medical Profession.* — The meetings between the Public Relations Committee of the Massachusetts Medical Society and the Public Health Council have already been referred to as forming the basis of sympathetic understanding and cooperation. Already we have gone to this committee for further advice. In addition a committee of the Tuberculosis Section of the Society has advised with us on a future tuberculosis program. A similar committee of the Obstetrical Section is working out a nursing program in the prenatal and postnatal fields where there has been, perhaps, the maximum of misunderstanding. The Public Health Committee of the Society continues to advise on many matters, such as the standards for clinics for gonorrhea and syphilis and a possible program against the mounting deaths from appendicitis. The Cancer Committee of the Society continues, as it has from the first, to guide our cancer program.

The Massachusetts representatives of the American Academy of Pediatrics are advising on various matters, and with the President of the Academy, Dr. John Lovett Morse, have met with the physicians of the Nashoba Health District and worked out a program for the health supervision of infants and children in the office and well child conference. Surely swords are being turned into plowshares!

We may have an end to the reproach thrown at health officers that their programs more and more aim to rob the doctor of his private practice. Earlier studies have shown that for every cancer patient seen in a clinic there are eleven going to the private office. Recent studies, about to be published, show that the more active a community is in diphtheria immunization in clinics, the more of such immunizations are done in private offices. It sounds crazy but it is not. It certainly gives the lie to those smug health officers who say they are doing none of this work but leaving it all profitably to the physicians. The health officer and private doctor both do it, or neither do it.

Again there is an increasing tendency to attempt to develop services locally rather than to have them on call from a distance. In venereal disease and cancer this has been on trial with varying success for some years. Local practitioners have been found, in general, entirely unsatisfactory as clinicians in the tuberculosis dispensaries. But fortunately we now have enough city, county and State sanatoria to furnish such service. More recently in pneumonia and poliomyelitis we are looking to local physicians for service. This is much sounder if it works.

One of the aspects of the Report of the Committee on the Costs of Medical Care that should particularly interest health officers, and doctors, too, is the complete service therein visualized, which would assure through the private physician periodic examination, the correction of defects, immunization, the early recognition of disease and the like, for the people served from before the cradle to the grave. Thus the health officer would be relieved of a great clutter of services which is increasing in volume chokingly and at best can be maintained at a respectable qualitative level only by eternal and Herculean vigil. He could then stick to sanitation, certain diagnostic laboratory service, the provision of biological, chemical and other suitable prophylactic and therapeutic agents, vital statistics, epidemiology, the great art of popular health education, and the greater art of assisting in the effective correlation of all private and public agencies into a unified program for the health of the people.

*Union Health Districts.* — Under the continued aid of the Commonwealth Fund of New York City, the sympathetic support of the boards of health involved and a competent professional personnel, the Southern Berkshire and Nashoba Health Districts have completed their first entire year of service after their initial organization. The following services have been instituted in these districts for the protection of the 45,000 inhabitants: (1) a splendid diagnostic service for tuberculosis in the Ayer Hospital by the staff of the Middlesex County Tuberculosis Hospital. Similar service out of the Westfield State Sanatorium at the Fairview Hospital in Great Barrington is contemplated; (2) Well-Child Conferences have been initiated in Nashoba and expanded in Southern Berkshire; (3) similarly, milk inspection has been initiated in Nashoba and expanded in Southern Berkshire; (4) diagnostic service in poliomyelitis with convalescent serum is available; (5) serum and laboratory services are available for lobar pneumonia; (6) Medical Institutes for the profession of both areas are to be held again this winter; (7) diagnostic, milk and water laboratory services are available in both areas; (8) an admirable dental hygiene



program is operating in the Southern Berkshire and is in process of formulation in Nashoba; (9) the diffuse problem of public health nursing in the two areas is being correlated and unified; (10) regular conferences have been in operation in Nashoba and are being instituted in Southern Berkshire between the public health nurses and a social worker from the Department on the multiple medical, social and economic problems arising at every turn, except for those who will not see; (11) staff education has begun and is being extended intelligently. The problem now is to extend and improve this rapidly developed service and to build informed public opinion about it. Surely the influence of these units will be far reaching.

The Barnstable County Health Unit has been particularly active in diphtheria immunization which has been badly neglected on the Cape. As mentioned, the death of Mr. G. Webster Hallett was a very great loss.

*Economic Curtailments.* — There seems to have been no large general attack on local health appropriations, perhaps because, in general, they have been relatively so small. One city in the name of economy has fused health and welfare and put an untrained person at the head. Naturally in his bewilderment his attention has been focussed on the staggering welfare problem. The neglect of health in this instance makes a parody of economy.

A few nurses have been dropped; others put on part time. Four communities have given up their dental hygiene program; a few more have curtailed. There are threats of giving up the meagre appropriations for diphtheria immunization, and yet it takes but a few hospitalized cases (and who would not hospitalize diphtheria) to cost more than the immunizations. There are suggestions that the Boston child hygiene program is threatened. Certainly if the children of Boston ever needed this work, it is now.

We who are responsible may, I think, rightfully ask that until the popular but, from the health point of view, entirely irrelevant scavenging service has been taken out of the general tax levy, the generally pathetically meagre appropriations for the health of the people remain, though we must get headaches trying to use such moneys more intelligently.

## II. COMMUNICABLE DISEASE

In general, except for scarlet fever, communicable diseases have been low this year, many of them dropping to unprecedented levels. That some of these, like diphtheria, tuberculosis and typhoid, are diseases for the control of which we have a rational method is encouraging.

*Outbreaks.* — But five outbreaks of any note occurred, and they were all small except for the 60 cases of smallpox in Fitchburg which were spread by early unrecognized cases, emphasizing the importance of supposed chicken pox in adults. Eleven cases of typhoid were spread by a carrier handling raw milk in the Berkshires. Twenty, out of twenty-five, consumers of milk from a one cow dairy in Topsfield contracted septic sore throat, and three died. From the attack rate and the appearance of the cow's quarter at autopsy, the infection must have been overwhelming. Eight cases of scarlet fever in Brockton were spread by milk which was apparently infected at the time of bottling and capping. It certainly emphasizes the importance of mechanical capping, as required by our pasteurization regulations. Three families in Ipswich had gastro-enteritis, apparently spread by raw milk since milk was a common factor and the first case was in the milker himself.

*Anterior Poliomyelitis* (Infantile Paralysis). Astonishingly, this year showed the lowest number of cases (61) and deaths (13) of which we have record. This was unexpected since usually in the year following an epidemic (1428 cases and 114 deaths in 1931) we expect the incidence to be above normal, which would have meant 400 to 600 cases. With the general alertness of the profession to this disease, the reported incidence is probably reasonably reliable. The significance of this low incidence is not clear.

This year in the early summer we distributed convalescent serum to some forty hospitals over the State, selecting those willing to hospitalize this disease. In connection with the distribution of this serum we urged the development of a diagnostic service which might fit local conditions. In addition, we had on call three consultants for the Department to take such calls as could not otherwise be met. While the calls were so few that the plan was not really given a trial, we feel it is



sound and hope that it will work. In all this we profited by advice from the Harvard Infantile Paralysis Commission whose after-care work is being taxed to the utmost as a result of the 1931 outbreak and whose research goes on uninterruptedly.

*Diphtheria.* — The 1,811 cases and 107 deaths set a new low level for this disease, which has been decreasing steadily since 1929. The decrease in demands for antitoxin is natural, and it has been suggested that a charge might be made for this product in order to penalize those indifferent to immunization.

The decrease in demands for toxin-antitoxin (we are now ready to give toxoid to physicians but not clinics since it must not be used in school age or older) is distressing. Those rationalizing inactivity by saying that chance, providence, biology or anything but immunization has lessened the incidence of diphtheria are shown to be humbled by figures collected by Dr. Anderson and soon to be published, indicating that in the last decade the higher the rate of diphtheria immunization in a community, the greater the relative decrease in incidence of the disease. The same study shows unequivocally that the more active the immunization clinic program, the more similar work is done in the private office. (Q.E.D.)

Twelve new communities put on active immunization programs this year, the most notable of which were Somerville and Taunton. That leaves only fifty of the 355 cities and towns without any semblance of organized control, the largest of which are West Springfield and Weymouth. As the year closes there is some increased incidence of diphtheria in Athol and Lowell.

It is encouraging to note some increase in protection of pre-school children. That 60 per cent of diphtheria deaths occur under five years and some 70 per cent of immunizations occur over that age has been repeatedly noted with irony. To encourage parents to obtain this service privately for their children in the first year of life we prepared a card which many boards of health are distributing by the public health nurses on the basis of birth certificates.

*Bacillary Dysentery.* — Apparently this disease is of more importance than we had realized and accounts for many of the acute self-limited outbreaks, euphemistically termed gastro-enteritis, summer diarrhea, intestinal influenza or just "something I ate." The Children's Hospital is finding the Sonne strain quite frequently, while we have picked up here and there the Hiss-Y organism. Dr. Feemster, in cooperation with the Harvard School of Public Health, is studying bacteriophage in these cases. This work may prove of real etiological and epidemiological significance.

*Gonorrhea and Syphilis.* — As in New York State, we find a slight decrease in reported cases of gonorrhea and a slight increase in reported cases of syphilis over last year. The lapsed cases reported are about the same. As reporting from clinics is more complete than from offices and as the economic situation might well drive a larger proportion of cases to clinics, we had rather expected an increased reporting for both diseases. But our 14 State-aided clinics report about the same number of cases of syphilis and less gonorrhea. A study of the records to compare the early syphilis with former years will be interesting. Some have suggested that the depression may lessen commercial prostitution and thus exposure. From the crude data that we have, it is impossible to say.

On the other hand, with somewhat fewer new cases the clinics report 18 per cent more visits which suggests more adequate treatment. Also it suggests more effective follow-up, such as was developed so strikingly at the Lowell Clinic last year. This year, with the assistance again of the Massachusetts Society for Social Hygiene, one of the nurses with the Fall River Health Department has been given special training at the Lowell Clinic and the clinics in Boston to improve this service in Fall River.

The Minimum Standards for the Conduct of Clinics for Gonorrhea and Syphilis, and the care with which they have been worked out with a large cooperative group, have already been referred to. With the aid of the Boston Emergency Relief Fund, a special free evening clinic was opened at the Boston Dispensary. It is hoped that the Department can take over this financial aid on its new budget since, relatively, the State is giving much less aid for these diseases in the Boston Metropolitan Area than anywhere else in the State. During reorganization of the Lynn Clinic, State aid has been temporarily withdrawn.

Last July a new five year contract for the purchase of arsenicals was signed with Merck and Company. The figure was far more favorable than would be the cost of going back to the manufacture of the products ourselves. Forty-six thousand grams were distributed which is about one per cent less than last year. As the tendency is to use more conservative dosage, it is suggested that actually more patients may have been served than previously. The total number of physicians, in addition to clinics, receiving our arsenicals is 782, 120 having been added this year.

Reports are being prepared on: (1) visits by one of the staff physicians to the offices of over 1,000 doctors to discuss gonorrhea and syphilis particularly and the services offered by the Department, and (2) the offer to certain physicians of our social worker to do follow-up work on private cases of these diseases. They are both full of interest. Printed matter was distributed and extensive lecturing done as usual, besides two radio addresses which, while frank, apparently did not offend. Are the prudists dead or merely sleeping?

*Influenza.* — Though the newspapers and their advertisers may not let us go through the winter without an "epidemic" of influenza, the weekly reports from some 16 large industries and institutions widely scattered over the State show as yet nothing unusual as regards respiratory disease absenteeism. The thing reported in the newspapers and Federal bulletins as occurring first in California (why must California always appear to threaten us; first, with meningitis some years ago, recently with psittacosis and now with "influenza"), then some of the Southern States and more recently Pittsburg, is no more like what influenza connotes to most of us as a result of the World War than is a cat like a panther. Why cannot we call it gripe or a severe cold and have it as we always have it in New England winters with regret but without panic? But no— The manufacturers of proprietary "cures" or "preventives" must get out of the depression by depressing us, until like children in a nightmare we are so demoralized by repetitious "warnings" that we pay good money, which should go for more milk, fruit, vegetables and cereals, for these same proprietaries in order to "prevent" something which we could not get if we tried. Great is Diana of the Daily Press!

*Malaria* — Fourteen cases were reported: one therapeutic, one apparently contracted in Massachusetts (it seems impossible) and eleven contracted outside the State. With the help of Dr. Wilson G. Smillie, our Epidemiological Consultant, we are supervising the sanitation of the construction work on the Ware and Swift Rivers that malaria may not be brought in as it was in 1900 when the Wachusett water system was constructed.

*Measles.* — Fortunately, this disease reached a new low level, with 19,763 cases and 64 deaths. The Merrimack Valley showed a good deal, and last spring from a focus in Franklin County it spread down the Connecticut Valley. As the year closes there is some increase in the Southeastern section. Deaths can be controlled through proper nursing and through use of adult whole blood or serum (we put out ampoules of sodium citrate to prevent clotting) to prevent or mitigate the disease in infants and young children. Between seven and ten is probably the optimum time to have the disease (certainly better than under five or over twenty-one) and until we have an active immunizing agent parents should welcome the disease in this age period with as much philosophy as this jittery world has vouchsafed to them.

*Lobar Pneumonia.* — The 1,668 deaths as contrasted with 1,718 in 1931 marks a new low point for this disease. Under the Pneumonia Service and Study Program, now in its second year and made possible by a grant from the Commonwealth Fund of New York City, sputum typing and concentrated type I and II serum are available in and around thirteen centers in the State. Over one hundred type I early cases treated last winter showed a mortality of 10.5 per cent, which has not been bettered anywhere. Epidemiological studies by Dr. Smillie show that only types I and II pneumococci appear more frequently in throats of contact than in those of non-contact individuals. With extension of experience and studies in these and the serological fields an advance in control of the second most killing communicable disease in this climate may be made. Also, incidentally, and perhaps most significantly, a technique in decentralizing a specialized service without concomitant loss of quality may be developed.



*Meningococcus Meningitis.* — The increased incidence of this disease, feared in 1930 as spreading toward us across the country, did not occur. With only 83 cases and 34 deaths, a new low point was reached. As with floods, so with disease. They may spend themselves over broad sweeps of country. On the other hand, given appropriate geography or biology, they may both acquire impetus. But our geographical ignorance is somewhat less colossal than is our biological!

*Rabies.* — For the first time in six years there has been no hideous human death from this disease. In the summer of 1931 with three human deaths on three successive days, thousands of dog-bites reported to us, and hundreds of rabid heads examined in our laboratory, we called together the boards of health, police officials, dog officers, and mayors and selectmen of all the communities in the State. With the Department of Conservation, we recommended immediate synchronous quarantine of all dogs by all cities and towns, and also through public clinics making widespread voluntary use of protective inoculations of dogs. Ninety-nine communities followed the quarantine advice, enforcing it with varying effectiveness; 256 did nothing. Yet from that day the incidence of the disease began to abate. Does advice not followed have any favorable effect on disease? Is there an absent treatment for filterable viruses? Evidently, as in the past, the disease had "burnt itself out." In a few years it will return again and the old cudgel will be grasped anew with all the old heat and futility. In the meantime, we must commend Belmont, Framingham, Natick, Watertown and Wellesley for offering immunization clinic service to all dog owners. It is the only preventive program against this ravenous disease that is at all practical with the present temper of the people.

*Scarlet Fever.* — This year we had the largest number of cases ever reported, 16,580, and the deaths, 145, were the largest since 1924. Of course, the mildness of the disease has made early recognition, and therefore control of the disease, most difficult. A disturbing thing is that not infrequently serious complications appear in mild cases; otherwise we might shrug and say, "let them get their immunity while the disease is mild." Many a board of health has been forced to seek added appropriations to meet the large item for scarlet fever hospitalization. Soon we hope to resume distribution of scarlet fever antitoxin. We devoutly hope that soon active immunization will have reached that point of definiteness so that we can recommend its general use. In the meantime we view with great interest the intelligent work of the Detroit Health Department on modified periods of quarantine and passive immunization with convalescent serum. We are delighted that the Massachusetts Association of Boards of Health is considering devoting a meeting to this timely subject, and we hope that out of it some communities with adequate public health nursing may try some adventures in this field.

*Smallpox.* — The 60 cases of smallpox in Fitchburg last winter and the efficient vaccination, in spite of organized opposition to use of knowledge (I wish someone would organize opposition to use of ignorance), of some 40,000 persons in one week has already been referred to. Gratitude for leadership is certainly due to Mayor Carriere. Thanks to Dr. Burns, the Chairman of the Fitchburg Board of Health, and Dr. Roy F. Feemster of this Department, the records were in such form that studies could be made which gave anew figures in regard to the effectiveness of vaccination as a protection against smallpox (it is almost like advancing figures to prove that sunlight is a protection against the dark). The rate of smallpox per 100,000 of the population was as follows: (a) among the unvaccinated, 1,048; (b) among those vaccinated over 40 years ago, 61; and (c) among those vaccinated less than 40 years ago, 0! And yet we are told that it is the bathtub rate that prevents smallpox!

In addition, there were two cases of smallpox in Pittsfield, two in Worcester, and one each in Boston, Gardner and Leominster. Spread was prevented by prompt recognition and vaccination of all known contacts.

*Tuberculosis.* — With 3,994 cases and 2,041 deaths reported, pulmonary tuberculosis reached a new low mark. This is one of the diseases which we fear may be increased by extensive and prolonged privation. Yet how pathetic it is in view of our present knowledge and with our relatively lavish resources that less than two cases should be reported for every death. Dr. Pope finds that 25 per cent of all cases are dead within six months of report and that 75 per cent of the fatal cases are reported less than six months before death, with 15 per cent coming in after



death! When you think that the average period of hospitalization of the tuberculous is over one year, and consider how advanced 80 per cent of the cases are when they enter the hospital, it is shocking how gross most of the disease is before it is even reported. Through correlating the resources of boards of health, school committees, the various sanatoria with portable X-ray, the tuberculosis associations and the private physicians, it is hoped that more respectable early case finding may be generally instituted.

The State and county sanatoria show marked improvement in the quality of their medical care. With the new Surgical Unit at the Rutland State Sanatorium, 228 operations were performed, supplemented by 20 at the Massachusetts General Hospital. Of all the patients, 32 per cent are on pneumothorax while 8 per cent more have some form of surgical collapse. An up-to-date X-ray equipment has further improved the clinical work in the hospital, and we are furnishing clinicians to five communities for extramural service. At the Lakeville State Sanatorium for non-pulmonary tuberculosis, 142 operations and 867 plaster casts were done. This is an increase of nearly 50 per cent over last year and has required a 50 per cent increase in the time of the consulting staff. Special courses through University Extension and vocational guidance have been arranged for suitable patients, as well as a course in home hygiene. A thoroughly equipped occupational therapy workshop is in constant use. The North Reading State Sanatorium is finding an increased demand for care of infants and children under six years, 32 per cent being in this group as contrasted with 23 per cent in 1931. Both here and at the Westfield State Sanatorium there is a most gratifying increase in the proportion of children showing minimum stage of the disease. More than anything else this must be attributed to the work of the Chadwick Clinics. Two conferences at Westfield on the prognosis of children under 17 with adult type disease have led us to decide to use collapse therapy more extensively for supplementing bed rest. Westfield had 2,016 visits to its out-patient and has extended its extramural clinic service.

In regard to the county sanatoria, the opening of Middlesex last year showed strikingly a popular appreciation of a high grade of service since, although it had more beds than needed to care for all tuberculosis patients then hospitalized from this area, it immediately filled up and has run a waiting list which is about 80 at present. Their routine examination of family contacts shows 20 per cent already have tuberculosis. Already they are staffing extramural clinics in the Ayer and Newton hospitals. From the Plymouth County Sanatorium similar service has developed for Brockton. The new Worcester County Hospital at West Boylston is prepared to open about February first and give an admirable quality of service. All the county sanatoria now provide for pneumothorax and many have arranged for thoracic surgery. The county and State sanatoria superintendents have formed an invaluable advisory committee to the Department.

We are in the ninth year of the Ten Year Program for Childhood Tuberculosis. During the school year 1931-1932, 68,899 children were examined in the Chadwick Clinics, being 69 per cent of all the grade children in the communities visited and 62 per cent of the high school children. For the third successive year the percentage of reactors among the grade children has dropped, being 17 per cent where formerly it was 28 per cent. This phenomenon is receiving intensive study. In the high schools 31 per cent reacted. The Follow-Up Clinic examined 6,297 children, of whom 442 were found unimproved, 90 being recommended for sanatorium and 393 for summer camp care. Dr. Paul Wakefield resigned this fall to accept the position of Superintendent of the Central Maine Sanatorium, after having served admirably for nearly five years as Chief of the Chadwick Clinics. Dr. David Zacks has been put in charge of these, as well as the Follow-Up Clinics.

With a committee of the Tuberculosis Section of the State Society, our Committee of Sanatorium Superintendents, the Executive Committee of the State League and others, we have worked out the following cooperative program for adequate case finding and follow-up in the State: (1) A routine tuberculin test of all children in the schools about the eleventh year of age and again at the sixteenth year; (2) the reactors to be X-rayed at the sanatoria or with portable equipment at the schools by the staff of the appropriate city, county or State sanatorium; (3) through regular competent clinics the families of all diseased children to be examined and X-rayed. We have beds enough, relatively, but we are using them

too much as morgues. In this way we will find in one year more unsuspected early favorable tuberculosis than we have in the past found in a generation! It will require cooperation of many agencies under the responsible leadership of the local board of health.

In this connection we have again put into the Legislature a bill which would allow us to withhold the tuberculosis subsidy unless a community has a minimal control program. The resources are available and the threat of withholding subsidy might encourage the recalcitrant to use them! Also, under chapter 39 of the Resolves of 1932, Mr. Theodore Waddell, the Director of Accounts in the Department of Corporations and Taxation, and I put in a report recommending that the direct charge to cities and towns be the same whether the patient goes to a county or a State sanatorium. This is to remove artificial restraints against free use of beds. We did not feel so strongly what that charge should be but to start the argument we suggested \$14 per week. It is quite imperative that the legislation suggested should be passed.

The stage is all set with splendid resources for the further conquest of tuberculosis. Have we the gift to all work together to that end?

*Typhoid Fever.* — The reports show 214 cases and 25 deaths (giving a death rate for the State of .6 per 100,000). This is the lowest incidence ever recorded, and the significant thing is that the decrease is not in cases in outbreaks, which are about the same as last year, but is in the endemic cases. The sources of infection were found in 51, which are, of course, much more difficult to find in the endemic cases than in the outbreaks. There were 5.6 new carriers found for every 100 cases, which is over twice the record of any previous year. Among the known sources 53 per cent were carriers, 29 per cent contact with other cases (3 of these, unimmunized nurses in three of our general hospitals!), and 18 per cent milk. Two carriers were removed from our list, having been followed for over a year after gall bladder removal and shown to be cured of their carrier condition. Our District Health Officers are certainly showing their mettle in this whole field of typhoid control.

Cholecystitis (gall bladder disease) of typhoid origin has been declared dangerous to the public health and is therefore reportable. This gives local boards of health unequivocal authority to control the uncooperative typhoid carrier who continues to spread disease and death.

*Undulant Fever.* — Fifteen cases of this disease, spread through milk by the organism of contagious or septic abortion in cattle, were reported. We have no knowledge of the prevalence of human infection throughout the State. It is, however, interesting that serological examination of all the patients at the Essex County Sanatorium some three years ago, when raw milk was served, showed about 10 per cent positive. Since then all milk has been pasteurized, and this year a re-test showed no patients reacting. However, there is no reason to suppose that infection in Massachusetts would ever reach the high level reported from some of the Mid-Western States since 85 per cent of our people drink pasteurized milk.

*Biologic and Diagnostic Laboratories.* — The processing of considerable convalescent anterior poliomyelitis serum was done by the laboratory this year. The distribution of concentrated anti-pneumococcus serum and old tuberculin has doubled over last year. As already pointed out, the demand for toxin-antitoxin fell off, as did that for diphtheria antitoxin. Toxoid may, we hope, encourage infant and pre-school immunization. Investigations are going on in regard to diphtheria antitoxin, the various scarlet fever products, improving the anti-pneumococcus serum, toxoid and anti-meningococcus serum.

Some 32,000 specimens were examined in our diagnostic laboratory. It is interesting that the decrease in diphtheria cultures was far less than the actual decrease in reported prevalence. Sputa for tuberculosis and pneumococcus typing showed a marked increase. If the work in connection with bacillary dysentery extends, it will put very heavy demands on this laboratory.

### III. NON-COMMUNICABLE DISEASE

Personal hygiene is, of course, the essence of the control of non-communicable disease. It is a matter of personal initiative, sorry to relate, and, sorrier to relate, its basis is moderation. These are sorry things to relate because anything like a



unanimity of personal initiative is hard to institute (even though we are said to be like sheep) and harder still to sustain, and moderation in a world of loud noises and rackets is generally considered dull and Victorian. Then, too, while people may have more time to think of their personal hygiene in these times, it may be claimed that they have less resources to indulge it. But fortunately immoderation is more costly, even immediately, than moderation, and except for those actually in want there is nothing in personal hygiene which, with a little ingenuity, should be beyond their reach. The balanced diet costs no more and may cost less than the unbalanced one. Moderate exercise, which may be walking, plenty of sleep, and water, recreation which comes from within or not at all, work if you are fortunate enough to have it, erect posture, toeing straight ahead or even toeing in, eating slowly and laughing occasionally so your stomach will have a chance, and training yourself even as you would train a dog so your bowels will have a chance, informing yourself of the early signs and symptoms of the important diseases as you would for the important danger signs in your children, and when they appear seeking medical advice in which you have confidence promptly at the private office or clinic — all this and more is personal hygiene and is dependent on intelligence rather than economics. If the depression can work such things into the warp and woof of the consciousness of the people there will be lasting good, as out of some by-products of war.

To help in all this we, as all other health departments, have striven eagerly.

*Maternal, Infant and Child Hygiene.* — Requests for prenatal letters and post-natal letters have grown until at the end of the year we have 21,900 names on our register, an increase of 25 per cent. Very significantly, in response to our request, the Obstetrical Section of the State Medical Society has appointed a committee which is working with us on an outline of a program for public health nurses in this field. After this, there are many other problems on which they can help us think straight. Through our consultant nurses mothers' classes have been stimulated and there are now plans to extend these to mothers of pre-school children. The eagerness for simple information in regard to child hygiene is most stimulating.

The five-year well child conference demonstration in Franklin County has been concluded and will be reported. Elsewhere in the State, 31 such conferences were held in twenty-nine communities, serving 1,110 children. In many instances the difficulties of teaching at these conferences are increased by poverty. Eight communities have been added to the list of those with permanent local conferences. Particular attention was given to Martha's Vineyard and Nantucket, where local interest was concretely demanded by financial support.

The Governor's Massachusetts Committee on the White House Conference on Child Health and Protection ended its task of arousing public interest last June with an institute in Worcester. During its year of existence it placed 365 speakers in 105 communities. Its mantle has permanently fallen on the Massachusetts Child Council.

In five communities on request school hygiene surveys have been made. One series of school hygiene conferences was held in different parts of the State and again a satisfactory school health examination was demonstrated. High school health councils have been formulated in cooperation with the Department of Education and have actually been demonstrated in Yarmouth and Norwood. Leominster and Nantucket have formulated plans for such a health council and the Salem Teachers College has one effectively operating. Courses for teachers and school nurses were again given at the Hyannis Teachers College, and at Fitchburg nutrition courses were repeated last summer, emphasizing low cost but well-balanced meals, and making nutrition practical and attractive to the adolescent. In 18 towns special hygiene classes for teachers were held and were open to high school as well as elementary teachers. The Daily and Monthly Report Form for the School Nurse put out by the Department is being more generally used and in some instances copies are being sent in to us. Too many nurses have no way of showing their superintendents just what they are doing and yet are surprised to find that often their work is not understood or appreciated.

*Public Health Nursing.* — Our six consultant nurses are now carrying generalized nursing programs which are much more exacting than if limited even to the vast field of child hygiene. In communicable disease control they are assisting the



District Health Officers in pushing particularly diphtheria immunization. Much time has been devoted to tuberculosis work. Eight more towns have appointed part-time nurses for follow-up work in this field. In seventeen hospital training schools our nurses are giving lectures in public health. One of our consultants has had charge of two excellent courses for public health nurses under the auspices of the New York University and the State Department of Health of New York. She also had charge of four continuation courses for those who had already taken the extension courses. In order to raise the standard of public health nursing, great effort has been made to have those already engaged in this work complete their high school education. The State Department of Education has cooperated and twenty-five nurses have already availed themselves of the opportunity. Miss Mary P. Billmeyer resigned in the spring as Department Consultant in Public Health Nursing after effective service. We hope to find as her successor one who, in addition to wide practical and administrative experience in the whole field, will be able to organize with our own Department of Education and some of our excellent teaching institutions extension courses particularly designed to our own peculiar needs.

*Nutrition.* — Perhaps just now this is as important a field as any of the newer activities of the Department and our limited staff of six nutritionists available for this work is being taxed to the utmost. Our Advisory Nutritional Committee has been of great help in working out plans to best meet the nutritional emergency demands. Local public welfare departments are for the first time asking our advice. It is an opportunity of enormous potentiality. In Fall River we worked out much of the technique, loaning one of our staff for two months. After circularizing all welfare departments we are meeting their requests for guidance as rapidly as possible, having prepared much new material on low cost balanced diets for them. Now through chain stores and wholesale grocers we are trying to get the information to a vastly wider audience. For the Red Cross we prepared special recipes to go with the distribution of flour. The home economics teachers in the schools are aiding in instruction in cooking. The school lunch problem is of increasing importance and we have helped Hanover, Chester and East Longmeadow in instituting them. Thousands of leaflets and many talks have been given. Nutrition education, spurred on by the impetus of the depression, has jumped two years in one year's time.

Our nutritional studies in connection with dental caries at the sanatoria have been carried on and will be referred to later. Nutrition service was given at 247 sessions of the Chadwick Clinics as well as at 15 chest clinics at Milford.

*Dental Hygiene.* — Our dental hygiene program is based on the recognition that caries is a deficiency disease and that early and continuous care is necessary for young children and that care of the mouths of adolescents prevents much adult disease. The program must integrate with the whole child hygiene field and involve the physician, dentist, dental hygienist, welfare department, health department, agricultural extension and home economics services, and nutritionists. In the Southern Berkshire Health District, for instance, they have developed a combination of the best type of traveling dental clinic service for school and pre-school children in outlying towns and cooperative planning for clinic service for the needy children by local dentists in the larger communities. The plan was developed by the Health District staff, the dentists and the doctors working together. Because the service is self-supporting it can be offered to towns outside the District.

The possibilities of arresting decay through diet have been graphically demonstrated in our sanatorium studies which will be reported at length when completed. Dr. Mark Elliott of the Forsyth Dental Infirmary has made three examinations of the children. One of our nutritionists has spent much time at the sanatoria and extra foods have been added to the test group, mostly sources of Vitamin C. The test group shows now only one-third as much caries as the control group.

Towns with schools interested in our Dental Certificate program have increased from 78 in 1928 to 178 in 1930, and 243 in 1932, while the proportion of children obtaining certificates has risen from 4 per cent in 1928 to 18 per cent in 1930 and 25 per cent in 1932. Interest has been inculcated through well child conferences. The examinations at our well child conferences in 1931 showed 54 per cent perfect teeth, in this year 42 per cent. The highest, 55 per cent, was found in Nantucket.

The depression has injured local dental programs, curtailing them in some places and abolishing them in four. Progress in dental hygiene work in Massachusetts was graphically exhibited at the State Dental Society meeting in Boston and the American Dental Association meeting in Buffalo.

*Education.* — The greatest volume of educational work is done by the Divisions of Child Hygiene and Adult Hygiene, and a fine piece of work they have done. From Child Hygiene advance publicity for the well child conferences is handled and 60 special nutritional releases have gone out. A particular effort has been made to advise local nurses on the preparation of their annual reports and to demonstrate to local organizations how they might prepare their own health exhibits. Child Health Day programs have more generally been turned over to the communities as a local responsibility, though we sent out a general news release and His Excellency the Governor gave out a proclamation. We have reports from 133 communities this year, while in 1931 it was 118 and in 1930 it was 182. There was a special exhibit on local request at the Martha's Vineyard Agricultural Fair. In connection with the program for the 4-H clubs, much effective interest was aroused in scoring on health habits. Assistance was also given at the camp for training leaders. Including much emergency nutritional material 1,218,649 pieces of printed matter were distributed, besides 25,000 copies of the Department's quarterly publication, *The Commonwealth*. This was less than half the amount handled last year because of our withdrawing from more active participation in the Child Health Day programs. Four hundred and fifty requests for material from other states were received, as well as from 37 foreign countries. This is reciprocal for the valuable material that we receive from elsewhere. After five issues this year we discontinued the publication of "Tidings." We have again begun to send health material to the schools, sending out over 100,000 pieces this fall. The Library Committee has done a fine piece of work in completing the cataloguing of all books and pamphlets. The usual lectures were given as well as the loans of movie films, delineascopes and posters.

The Division of Adult Hygiene arranged an exhibit at the Annual Meeting of the State Federation of Women's Clubs and the Massachusetts Conference of Social Workers. A course in "Healthy Living" is being given through the University Extension. Seven thousand inches of general newspaper space were obtained, or about 17 per cent more than last year. In addition, the "Health Forum" is being run weekly in 53 newspapers, totaling 28,000 inches. Eighteen thousand pieces of literature were distributed, including special material to all nurses at general hospitals. Ninety-three lectures and nine showings of the *Canti* film were given. This fall lectures on cancer to biology classes at all of the colleges in the State are being arranged. A new delineascope film has been prepared for showing, particularly to small foreign groups. There were 145 broadcasts, 41 in cooperation with a committee of the Massachusetts Medical Society, 52 by members of the Department staff and 52 were of the Radio Health Forum.

*Adult Hygiene.* — While 90 per cent of the efforts of the Division have been directed toward cancer control there has been some dispersion of effort into the whole field of adult health and general chronic disease control. That good personal hygiene over a long period of time has some influence on lessening the incidence of chronic disease is shown by the three years study of chronic disease in Massachusetts conducted with so much discrimination by Dr. Lombard. The group showing such poor health habits as continued nervousness, chronic indigestion and addiction to laxatives, chronic inactivity, consistent avoidance of the protein foods (dairy products, fruit and green vegetables), prior severe infection and the need of much dentistry — this group shows a higher incidence of all the chronic diseases. That either heredity or environment, or both, may also play a part is supported by the finding that those having one of the chronic diseases show a higher rate for these diseases in their ancestors and other members of the household than do those without these diseases. These data have now been analyzed and are ready for publication. The various methods of propaganda have been used in presenting this point of view to the public. In view of the continued shocking increase of appendicitis as a cause of death, and in the light of the success of a cooperative educational venture between the Medical Society, the Health Department and the druggists of Philadelphia, we are considering with the Public Health Committee of the Massachusetts Medical Society a program of education in this field. Since the appendicitis



death rate goes up in direct proportion to the number of laxatives and cathartics taken prior to operation, the point of educational attack is relatively simple and should be correspondingly effective.

*Cancer.* — The State Cancer Program, now in its sixth year, has accomplished results. This program is, of course, thought of in its broadest aspects and includes the services in doctors' private offices, in the large number of hospitals and clinics throughout the State which are entirely independent of State aid, the wide support of distinguished lay persons and organizations, as well as the more direct educational, clinic and hospital services for which the Department has an immediate responsibility. The result of the campaign is evidenced, first, by the fact that the increase in general hospital care in Massachusetts is 50 per cent greater than elsewhere in the country. Second, the last five years show no increase in the cancer death rate, as adjusted for age and sex, and this is the first time since records are available that this has occurred for anything like so long a period. Third, and perhaps most significantly, the improved death rates are most marked in the accessible cancers, which suggests that present knowledge has really been put to work for the benefit of the people.

Our studies have covered the economics of the cancer program; critical studies of the social service records of clinics as to follow-up and "failures" in a group not following advice (that 60 per cent of the clinic cases follow advice within a week of visiting the clinics indicates the incalculable service rendered by social service; I know of no other large scale service for any major disease that can approach this record); field studies as to possible etiological relations between a wide variety of environmental factors and cancer, including familial histories as to tuberculosis which will run for two years more and cover over 3,000 individuals, having been made possible by a grant from the Rockefeller Foundation; and a study of general hospital admissions for cancer now and in 1925. In addition, of course, intensive analyses of the records of State-aided clinics and the Pondville Hospital are currently going on.

We find that 30 per cent of the clinic patients need definite social service over and above the casual friendly contact. In the State-aided clinics there were 5,000 initial interviews with patients, families or friends, and 7,000 follow-up interviews. (Results of this stupendous discriminating effort are seen in the astonishing "advice followed" rate already referred to.) We have been surprised at the small proportion of "failures" and have studied them intensively. Next to competent interested clinicians a technically competent and discriminating social worker is a prime essential to a result-producing cancer clinic. She has brick and mortar beaten all ways.

The State-aided clinics in fifteen communities saw 3,200 patients, an increase of some 8 per cent over last year. (Yet it was said that after the first few years interest in cancer could not be maintained!) There was about the same proportion with cancer, namely, 24 per cent. The delay before visiting the clinic for accessible cancer is declining slowly, at the rate of about one month each year. It is exactly the same sort of battle as in the early recognition of tuberculosis. In Worcester in December the clinic staffs met with Dr. Pancoast of Philadelphia and Dr. Adair of New York. Following the clinic, a staff conference discussed the problem of the medical cancer group as contrasted with the individual, and the most effective use of clinic consultants. There were also two meetings for the local cancer education committees and the clinic social workers. In April six of the Boston hospitals held clinics devoted to the showing of cured cases of cancer. All physicians of the State were sent a summary of the 228 cases shown and all dentists were also invited to attend. At the general meetings, besides local speakers of distinction, Dr. Ewing of New York City, Dr. Bloodgood of Baltimore, and Mr. John Finley of the New York Times spoke. The Lynn Cancer Committee has been reorganized into the Cancer Association and is receiving support from the Community Welfare Chest. Social service has temporarily been discontinued in the Pittsfield clinic. The Greenfield clinic still remains closed. An important problem is a sound plan for service to this part of the State. Beginning this fall one of the Department doctors is visiting each clinic bi-monthly. This should bring us in much closer and more effective touch with the clinics. Certainly the whole program would be a hollow mockery without the sincere, disinterested devotion of the local medical cancer committees.



*Pondville Hospital.* — In the 115 beds at the Pondville Hospital 1,013 patients were served. This is over 10 per cent increase over last year. The total visits to the hospital clinic were 3,501, or 200 per cent more than last year. With a constant waiting list, at one time reaching 118, the effectiveness of the staff in handling this heavy burden cannot be over-emphasized. Without effective social service the difficult problem of adequate placement of patients could not have been met, and such a rapid overturn would have been impossible.

We have added to our visiting staff, which gives over 100 hours service a month, an assistant urologist, so that the total visiting staff is now twenty. An assistant physician, primarily medically minded, has been added to our resident staff making, with the superintendent, seven physicians in residence. A full-time nurse anaesthetist has been added and is most effective.

We are asking for a new service building which will provide kitchen and dining rooms adjacent to the hospital (the remoteness of these at present might make a good subject for Gilbert and Sullivan to parody), quarters for some forty employees, and on the top floor new operating rooms and laboratories. If this is granted, we should then like to add fifty more beds to meet the chronically heavy waiting list. The total cost will be about \$300,000 and this should end any essential expansion of this hospital.

#### IV. ENVIRONMENTAL CONTROL

As a result of the rainfall in the late summer and fall (the heaviest in this period recorded for some five years and making up for a spring deficiency) the total for the year is about  $2\frac{1}{4}$  inches in excess of the normal. However, from June, 1929, the rainfall was still  $14\frac{3}{4}$  inches below normal. The deficiency in rainfall in the months of April, May, June and July was considerable and there also were deficiencies in February and December. The rainfall in the months of January, March, August, September, October and November was in excess of the normal. The heavy run-off as a result of the fall rains produced potentially dangerous conditions, particularly in the western part of the State where much of the storage is inadequate, so that emergency chlorination was necessary in such communities as Williamsburg, North Adams and Northampton. Chlorination in the latter case became necessary when the principal source of supply was shut off because of repairs and an auxiliary source was used.

This year we have concentrated our efforts on the supervision of public water supplies, particularly those most vulnerable and with the least margin of safety. This is the most important single factor in environmental control since public water supplies serve 97 per cent of the people of the State. More intensive bacteriological analyses have brought to light many menacing situations that have been for the most part corrected and have frequently required the temporary use of our emergency chlorinating apparatus. This program has, of course, required much more laboratory work.

A great deal of valuable engineering service has been given to the five hospitals under the Department. But we have continued to resist the demand to give similar detailed service to the other State institutions since it would be impossible and, we feel, undesirable to expand sufficiently to adequately fulfill this responsibility. Perhaps as a part of a certain cynicism toward the general ineffectiveness of public employees there comes up constantly the demand for increasing responsibility without any increase in personnel. Such people would make a tight rope out of a shoe string and then show starry-eyed surprise when under use the string gives way!

Valuable service without cost has been obtained from the Emergency Planning and Research Bureau by this Department as by many other branches of government. Too great praise cannot be given to the engineering and architectural professions for their program of meeting unemployment among their members. Surveys of all the piping systems at our hospitals, many of which have grown over the years like Topsy, have been made and office records of water supplies and sewage disposal have been analyzed and brought up to date.

A large amount of laboratory and field work has been done in the supervision of polluted shellfish. Because of the condition of unemployment, more people have resorted to the digging and marketing of shellfish than was the case under normal conditions. We have received many requests for opening areas where shellfish were

of questionable quality. In this connection the work of preventing polluted shellfish from entering the market without having been adequately treated at the chlorinating plants has been rather trying. There also have been many difficulties in carrying out the law relating to the importation of shellfish from other states.

Under chapter 40 of the Resolves of 1932 the industries of Everett and Chelsea were studied in relation to their influence on health and comfort. A report has been made to the Legislature, which shows in brief that there is no evident menace to health, but that comfort is certainly impaired from time to time, and that the extent of such discomfort depends largely on the discrimination with which the plants are operated. Besides the laboratory work in connection with this study, investigations have been carried on as to the effect of wastes from gas plants on the municipal sewage filters in Brockton, how to remove caustic lime so that the sewers of Salem and Peabody will not become clogged, and the perennial problem of tannery wastes and sewage purification. Also, interesting work has been started on studying the effect of storage on the purification of Merrimack River water.

We are still anxious for sufficient resources to study the very important and vexing matter of bathing loads in relation to health. It is surprising in view of vastly greater use of natural bathing places, how many more factual data we have on artificial swimming pools.

*Milk.* — Milk is our most important single food product, and not even excepting shellfish, the most vulnerable to infection. The influence of the depression has not been to increase adulteration and dirtiness in our general milk supply. Probably the general sanitary quality of the milk of the State was never so good, though this is nothing to be complacent about. The increase in the minimum temperature of holding pasteurization from 140° F to 142° F has resulted in more cases of improper pasteurization. Apparently there is general fear in the trade of impairing the cream line. The number of pasteurizing plants has decreased from 640 to 611, which makes supervision easier and is not to be regretted since the closed plants are more largely the small ones, and the smaller the plant, the less fool-proof. Of 4,438 bacteriological samples, mostly of raw milk intended for pasteurization, 91.93 per cent complied with the law and regulations. The average of total solids and fats in these milk samples was higher than formerly and there were very few instances of watered milk. All of this is most fortuitous during a period of restricted nutrition.

There have been many significant steps taken in connection with milk. The Milk Regulation Board created by the last Legislature is about to promulgate dairy regulations which it is hoped will receive general acceptance by local boards of health and do away with much duplication and confusion similar to that which exists with differing quarantine regulations in adjacent communities. Also, through the Department of Civil Service, it is ready to appoint inspectors. It is to be hoped that after this work has become well established and accepted this Board may perhaps be given authority to promulgate uniform milk grading.

The tuberculin testing of cattle has now received practically universal agricultural acceptance. The irony of the thing is that this awakening should occur just when State and Federal appropriations for this work are most threatened. Last year there were 120 communities requiring that all milk be from non-tuberculous cattle or pasteurized (and Heaven knows that the tuberculin test protects against only one of some dozen diseases spread by milk), while this year the number has risen to 142. This gives this protection by regulation to about 85 per cent of the people of the State. As there is much testing of cattle and pasteurizing of milk without local regulation, the actual protection is probably considerably greater. About 12 inspired communities require pasteurization or certification.

There was a 20 per cent decrease in liquor samples submitted for analysis, but with the increase in milk and food samples the work of our Food and Drug laboratory was heavier than ever. This is an intelligent shift in effort. The mattress factories showed better compliance with the laws, and the slaughtering and cold storage violations were within what we have come to consider normal, taking human nature for what it is.

## V. PERSONNEL

The organization of the Public Health Council has not changed during the past year, the Governor having reappointed Dr. Strong and Mr. Tighe at the expiration of their terms.

On December 1, 1931, Mr. Edwin F. Quinlan was appointed as an additional Food Inspector in the Division of Food and Drugs. On January 31, 1932, Mr. Frederick L. Marion retired as Food Inspector, in which position he had given faithful service since 1907. Mr. Rudolph J. Holly was appointed on February 15, 1932, to fill the vacancy caused by Mr. Marion's retirement.

Frederica L. Beinert was appointed Public Health Nutrition Worker in January to replace Miss Mildred L. Swift.

The position of Head Supervisor of Public Health Nursing has been vacant since the resignation on March 31st of Miss Mary P. Billmeyer. It is hoped that a suitable candidate will soon be found to fill this vacancy.

Dr. Raymond Johnson was appointed as Epidemiologist in the Division of Tuberculosis on a temporary basis, beginning June 15, 1932, to fill the vacancy caused by the granting of a leave of absence to Dr. John Poutas.

In October Dr. Paul Wakefield resigned as Supervisor of Tuberculosis Clinics to take up institutional work in Maine, and Dr. Charles E. Gill was appointed to fill the vacancy, effective November first.

On November first Dr. Harold W. Stevens left the position of Epidemiologist in the Division of Communicable Diseases to become Health Officer of the Southern Berkshire Health Unit, retaining a part-time appointment as Epidemiologist with the Department. Dr. Frederick S. Leeder, formerly the Health Officer of the Southern Berkshire Health Unit, is now Epidemiologist in the Division of Communicable Diseases.

## VI. ORGANIZATION

The organization of the Department is as follows:

Commissioner of Public Health . . . . .	1
Public Health Council . . . . .	6
Division of Administration:	
Secretary (1), Epidemiological Consultant (1), Clerks and Stenographers (11) . . . . .	13
Division of Adult Hygiene:	
Herbert L. Lombard, M.D., Director.	
Epidemiologists (2), Social Workers (2), Public Health Education Workers (2), Field Epidemiologist (1), Clerks and Stenographers (16)	24
Division of Biologic Laboratories:	
Benjamin White, Director.	
Assistant Director (1), Chemists and Bacteriologists (8), Laboratory Technician (1), Laboratory Assistants (2), Laboratory Helpers (8), Stable Foreman (1), Laborers (15), Janitors (2), Clerks and Stenographers (6).	
(Wassermann Laboratory):	
Chief of Laboratory (1), Bacteriologist (1), Laboratory Technician (1), Laboratory Assistant (1), Laboratory Helpers (5), Clerks and Stenographers (3) . . . . .	57
Division of Communicable Diseases:	
Gaylord W. Anderson, M.D., Director and Deputy Commissioner.	
Assistant Director (1), District Health Officers (7), Epidemiologists (3), Clerks and Stenographers (8).	
(Diagnostic Laboratory):	
Bacteriologists (4), Laboratory Assistant (1), Laboratory Helper (1), Laborer (1), Clerks (2).	
(Venereal Diseases):	
Assistant Director (1), Epidemiologist (1), Public Health Social Hygiene Supervisor (1), Public Health Education Worker (1), Clerks and Stenographers (2) . . . . .	35



## Division of Food and Drugs:

Hermann C. Lythgoe, Director.

Chief of Laboratory (1), Chemists and Bacteriologist (5), Veterinary Food Inspectors (3), Food Inspectors (7), Laboratory Helpers (2), Laborers (2), Clerks and Stenographers (7) . . . . .

28

## Division of Child Hygiene:

M. Luise Diez, M.D., Director.

Child Welfare Physician (1), Public Health Dental Hygiene Supervisor (1), Public Health Nutrition Workers (3), Public Health Education Workers (2), Clerks and Stenographers (8).

(Maternal and Child Hygiene):

Child Welfare Physician (1), Public Health Nursing Supervisors (5), Clerks and Stenographers (6) . . . . .

28

## Division of Sanitary Engineering:

Arthur D. Weston, Chief Sanitary Engineer.

Engineers and Engineering Assistants (14), Clerks and Stenographers (12) . . . . .

27

## Division of Tuberculosis:

Alton S. Pope, M.D., Director.

Assistant Director (1), Epidemiologist (1), Superintendent of Sanatoria Construction (1), Inspector of Settlements and Support Claims (1), Social Workers (2), Field Nurse (1), Clerks and Stenographers (9).

(Tuberculosis Clinics):

Supervisors of Tuberculosis Clinics (2), Child Welfare Physicians (5), Field Nurses (4), Public Health Nutrition Workers (3), X-ray Clinic Field Agents (2), Clerks and Stenographers (9) . . . . .

42

## Division of Water and Sewage Laboratories:

Harry W. Clark, Director.

Chief of Laboratory (1), Chemists and Bacteriologists (10), Laboratory Assistant (1), Mechanical Handyman (1), Laborer (1), Watchman (1), Clerks and Stenographers (3) . . . . .

19

Total . . . . . 280

## VII. PUBLICATIONS

The following articles by members of the staff have been published:

*Division of Administration*

Physicians' Opinions on the Infantile Paralysis Service Offered in 1931—

Dr. George H. Bigelow and Dr. Harold W. Stevens,  
New England Journal of Medicine, 206: 194-195, January 28, 1932.

Hospitalization of Cancer in Massachusetts—

Dr. George H. Bigelow and Dr. Herbert L. Lombard,  
New England Journal of Medicine, 206: 607-609, March 24, 1932.

What Can the State Department of Public Health Do to Aid in the Program of this Section to Improve Practice of Obstetrics?—

Dr. George H. Bigelow,  
New England Journal of Medicine, 207: 297-299, August 18, 1932.

Economics of the Massachusetts Cancer Program —

Dr. George H. Bigelow and Dr. Herbert L. Lombard,  
New England Journal of Medicine, 207: 972-974, December 1, 1932.*Division of Adult Hygiene*

Role of the Social Worker in the Cancer Clinic of a General Hospital —

Eleanor E. Kelly,  
American College of Surgeons Bulletin, December, 1931.

How the Recommendations of the White House Conference Have Served to Stimulate Local Programs —

Dr. Mary R. Lakeman,  
Hospital Social Service, XXVI, 1932.

*Division of Biologic Laboratories*

- An Improved Diluent for Diphtheria Toxin in the Schick Test —  
Benjamin White, William E. Bunney and Wilbur G. Malcolm,  
*Journal Immunology*, XXII, 2: 93, February, 1932.
- Experimental and Natural Streptococcus Hemolyticus Infection of the Udder of the Cow —  
Elliott S. Robinson and James A. McComb,  
*Journal Infectious Diseases*, 51: 292-297, September-October, 1932.
- Studies on Meningococcus I. Endotoxin —  
Wilbur G. Malcolm and Benjamin White,  
*Journal Immunology*, XXIII, 4: 291, October, 1932.
- Antimeningococcic Serum. Infections of the Central Nervous System —  
Benjamin White and Elliott S. Robinson,  
*Proceedings of Association for Research in Nervous and Mental Diseases*, XII: 486, 1932.

*Division of Communicable Diseases*

- Chance Infections from Typhoid —  
Dr. Gaylord W. Anderson and Dr. Charles B. Mack,  
*New England Journal of Medicine*, 206: 398-400, February 25, 1932.
- The Control of Syphilis from the Health Officers' Viewpoint —  
Dr. Nels A. Nelson,  
*American Journal of Public Health*, XXII, 2, February, 1932.
- The Migration, for Treatment, of Patients with Gonorrhea or Syphilis —  
Dr. Nels A. Nelson and Dr. Henry M. DeWolfe,  
*Journal of the American Medical Association*, 98: 794-799, March 5, 1932.
- Reported Gonorrhea and Syphilis in Massachusetts in 1931 —  
Dr. Nels A. Nelson and Dr. Gaylord W. Anderson,  
*New England Journal of Medicine*, 206: 882-887, April 28, 1932.
- A Small Milk-Borne Outbreak of Septic Sore Throat —  
Dr. Robert E. Archibald and Dr. Roy F. Feemster,  
*New England Journal of Medicine*, 206: 1252-1254, June 16, 1932.
- The Recent Smallpox Outbreak in Fitchburg —  
Dr. Roy F. Feemster, Dr. Gaylord W. Anderson, Dr. Robert F. Burns and  
Dr. Henry M. DeWolfe,  
*New England Journal of Medicine*, 207: 82-87, July 14, 1932.
- Gonorrheal Vulvovaginitis —  
Dr. Nels A. Nelson,  
*New England Journal of Medicine*, 207: 135-137, July 21, 1932.
- A Study of Lobar Pneumonia in Massachusetts —  
Dr. Roderick Heffron,  
*New England Journal of Medicine*, 207: 153-159, July 28, 1932.
- Milk-Borne Typhoid —  
Dr. Frederick S. Leeder,  
*Canadian Public Health Journal*, XXIII, 11, November, 1932.
- A Study of Lobar Pneumonia in Massachusetts: Methods and Results of Pneumococcus Type Determination, 1931-1932 —  
Dr. Roderick Heffron and Miss Florence M. Varley,  
*American Journal of Public Health*, XXII, 12, December, 1932.

*Division of Tuberculosis*

- Basal Pulmonary Lesions —  
Dr. Paul Dufault,  
*American Review of Tuberculosis*, January, 1932.
- Report of the Cured Cancer Clinic held on April 5 and 6, 1932, at the Massachusetts General, Collis P. Huntington Memorial and Palmer Memorial Hospitals, The Free Hospital for Women and the State Cancer Hospital at Pondville —  
Dr. Robert B. Greenough, Dr. William P. Graves, Dr. Channing C. Simmons,  
Dr. Daniel F. Jones, Dr. Ernest M. Daland and Dr. Harry F. Friedman,  
*New England Journal of Medicine*, 206: 1294-1299, June 23, 1932.

What Can the Surgeon Expect in the Way of Guidance in the Treatment of Cancer from the Pathologist? —

Dr. S. Burt Wolbach,

New England Journal of Medicine, 206: 1299-1302, June 23, 1932.

Summary of Cured Cancer Clinics —

Dr. William P. Graves,

New England Journal of Medicine, 206: 1302-1304, June 23, 1932.

The Importance of the Informed Public Opinion —

John Finley,

New England Journal of Medicine, 206: 1304-1306, June 23, 1932.

Multiple Malignant Tumors —

Dr. Shields Warren and Dr. Olive Gates,

American Journal of Cancer, November, 1932.

The Sanatorium Child —

Dr. Leon A. Alley,

New England Journal of Medicine, 207: 884-893, November 17, 1932.

#### *Division of Water and Sewage Laboratories*

Carbonation of Industrial Wastes to Prevent Sewer Clogging —

Harry W. Clark,

Water Works and Sewerage, LXXIX, 2, February, 1932.

### VIII. LEGISLATION

The Department is submitting the following proposed legislation:

#### *Relative to Subsidies to Cities and Towns for Pulmonary Tuberculosis Cases*

At present the State pays five dollars a week to cities and towns for every case of tuberculosis in an institution approved by the State Department of Public Health. We now ask that such payments should also depend upon an adequate tuberculosis prevention program in the city or town receiving this subsidy.

Under this bill the money which the Commonwealth now pays would be spent more effectively. The Department of Public Health would secure, in addition to the approval of the committee as required by the act, the advice and assistance of a group of impartial men familiar with case finding, treatment and after care of tuberculosis in regard to minimum standards with which cities and towns would have to comply in order to secure the subsidy. Standards would be entirely "reasonable," time would be allowed and all possible advice and assistance would be given to local communities in developing an adequate tuberculosis service. The object of the bill is that money spent should be spent more effectively. Its primary purpose is not to control expenditures but to control tuberculosis.

Massachusetts now has more adequate tuberculosis hospital facilities per unit of population than any other state in the Union. With the recent opening of the Middlesex County Sanatorium and of the Worcester County Sanatorium there will be 4,200 beds in city, county, State and private hospitals for pulmonary tuberculosis, while in 1930 there were 2,423 pulmonary deaths. This gives a ratio of 1.7 beds for every annual death from pulmonary tuberculosis. This represents an annual maintenance cost of at least \$4,000,000, without any consideration of the many thousands in initial construction cost for each bed. Add to all this the cost of private medical, clinic, and nursing care, as well as lost employment, public and private dependency and poverty, and we see that in Massachusetts the annual cost of tuberculosis is in figures which we still associate with Liberty Loans and other emergencies.

But the worst feature is that these lavish hospital resources are being grossly misused. Less than 20 per cent of the patients enter these hospitals in an early and favorable stage of the disease, while as a reasonable minimum 60 per cent should so enter. What does this mean? First, the chance of life and return to independent gainful employment is enormously reduced. Second, the duration of stay in hospitals and therefore the cost per patient is greatly increased. Third, and perhaps most important, the number of patients with positive sputum spreading the disease for long periods before detection and subsequent hospitalization, is vastly more widespread than it should be. Thus, through infection of children, fellow workers, casual contacts on street and street cars, at meetings, concerts, crowdings of all sorts, perhaps through our most intimate friends, especially through close contact in the homes, tuberculosis is striving successfully for immortality.



Adequate resources for early case finding and competent follow-up of the cases leaving the hospitals, that the shockingly costly burden of "repeaters" may be diminished, is within the power of every city and town in the State today. Yet still we have communities that report more deaths than cases of tuberculosis (think of it!); others that almost never hospitalize until death is imminent and spread has been accomplished; many more with no thought of offering decent supervision to the ex-hospital patient to prevent or early to detect relapse. In some places there is not even wholesome dissatisfaction with these conditions. Surely if they cannot be improved we can stop the irony of paying State money to perpetuate such futility.

*Relative to Polluted Shellfish*

At present anyone delivering polluted shellfish can avoid conviction by claiming that such shellfish came from areas not designated by the Department of Public Health as contaminated or that such shellfish had passed a shellfish treatment plant. Unless we have been present at the digging and followed them all the way since, we cannot effectively disprove this. Thus protection of the public is nullified.

Our experience under this act is even worse than we suspected and we therefore ask that it be repealed in order that the public may be protected from the menace of consuming polluted shellfish.

*Authorizing the Town of Walpole to Supply Water to the Pondville Hospital in Norfolk*

In order to assure against inadequacy in the water supply of the Pondville Hospital in Norfolk, legislation authorizing the Water Commissioners of Walpole to lay mains and sell water within the town of Norfolk and to the Pondville Hospital is necessary.

*Relative to the Treatment of Gonorrhea and Syphilis and to Records of Cases of Gonorrhea and Syphilis*

The wisdom of the following modifications of existing statutes pertaining to gonorrhea or syphilis is self-evident. They aim:

(1) To remove any doubt as to local responsibility for furnishing treatment to infected indigents for the good of the individuals and the protection of the public;

(2) To decrease discrimination against infected persons needing hospitalization for their own good and the protection of the public health; and

(3) To remove any possible restraint from a physician who believes it advisable to give information necessary for self-protection to the husband or wife of an infected person under his care.

The words "gonorrhea or syphilis" are substituted for the words "venereal diseases" for the sake of conformity with the statutes. Gonorrhea and syphilis have been declared diseases dangerous to the public health but venereal diseases have not been defined either by the legislature or the State Department of Public Health.

## IX. FINANCIAL STATEMENT

### *Appropriations and Expenditures for the Year ended November 30, 1932*

	Appropriations Plus Amounts Brought Forward	Expenditures to November 30
Division of Administration . . . . .	\$39,199.64	\$36,264.43
Division of Adult Hygiene . . . . .	81,606.09	80,015.58
Division of Child Hygiene . . . . .	54,511.05	49,302.13
Maternal and Child Hygiene . . . . .	35,886.01	33,541.18
Division of Communicable Diseases	91,786.51	87,999.54
Venereal Diseases . . . . .	44,254.63	42,913.15
Division of Food and Drugs . . . . .	64,575.00	63,184.39
Administration of Shellfish Law . . . . .	3,220.00	2,819.86
Division of Biologic Laboratories:		
Antitoxin and Vaccine . . . . .	108,814.70	107,009.76
Wassermann Laboratory . . . . .	22,200.80	21,553.98
Division of Sanitary Engineering . . . . .	85,119.66	85,063.92
Division of Water and Sewage Laboratories	49,841.04	49,585.04
Division of Tuberculosis . . . . .	42,114.87	41,682.85
Subsidies to Cities and Towns . . . . .	343,500.00	343,320.37
Tuberculosis Clinic Units . . . . .	91,414.01	90,063.44
	<hr/> \$1,158,054.01	<hr/> \$1,134,319.62

*Special Appropriations and Expenditures for the Year ended November 30, 1932*

	Appropriations	Expenditures to Nov. 30, 1932
Investigation Coastal Waters of Barnstable, Dukes and Nantucket Counties, Chapter 312, Acts 1929. 1931 Balance . . . . .	\$1,206.03	—
Experiment Station Fire (1931 Balance) . . . . .	2,040.58	\$1,995.23
Offensive Odors—Everett, Chelsea. Chapter 40, Res. 1932 . . . . .	5,000.00	4,686.08
	<u>\$8,246.61</u>	<u>\$6,681.31</u>

*Receipts for Year ended November 30, 1932*

Licenses, etc. . . . .	\$2,582.12
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*State Sanatoria and Pondville Hospital*  
*Appropriations and Expenditures for the Year ended November 30, 1932*

	Total Appropriations Nov. 30, 1932	Expenditures to Nov. 30, 1932
Lakeville State Sanatorium . . . . .	\$281,442.02	\$274,073.48
North Reading State Sanatorium . . . . .	237,647.36	228,914.97
Pondville Hospital . . . . .	251,219.66	240,833.62
Rutland State Sanatorium . . . . .	312,891.00	285,837.41
Westfield State Sanatorium . . . . .	252,405.17	236,583.07
<i>Lakeville:</i>		
Acts 1930, Chap. 115, Item 633 "New Water Supply" . . . . .	6,800.00	6,005.91
Acts 1929, Chap. 146, Item 587 } "Additional Fire Protection" . . . . .	17,700.00	17,690.06
Acts 1930, Chap. 115, Item 632 }		
Acts 1930, Chap. 115, Item 629, "Superintendent's Home" . . . . .	21,000.00	20,877.68
Acts 1930, Chap. 115, Item 630, "Alterations on Administration Building" . . . . .	13,000.00	12,844.26
Acts 1930, Chap. 115, Item 631, "Furnishings and Equipment on Children's Building" . . . . .	10,000.00	9,919.97
Acts 1931, Chap. 1, Item S, "Alterations of Two Buildings" . . . . .	17,000.00	15,993.52
Acts 1931, Chap. 1, Item T, "Repairs and Improvements" . . . . .	5,700.00	5,601.43
<i>North Reading:</i>		
Acts 1930, Chap. 115, Item 638, "Addition to Nurses' Home" . . . . .	20,000.00	19,999.07
Acts 1930, Chap. 115, Item 639 } "Employees' Building" . . . . .	75,000.00	72,366.01
Acts 1932, Chap. 170, Section 3 }		
Acts 1929, Chap. 146, Item 591 } "Power House Alterations" . . . . .	40,000.00	39,999.71
Acts 1930, Chap. 115, Item 635 }		
Acts 1929, Chap. 146, Item 592 } "Improving Water Supply and Fire Protection" . . . . .	42,700.00	42,605.31
Acts 1930, Chap. 115, Item 636 }		
Acts 1931, Chap. 245, Item 569 }		
Acts 1930, Chap. 115, Item 637, "Addition to Dining Room" . . . . .	4,000.00	4,000.00
Acts 1929, Chap. 146, Item 590, "Admission and Isolation Building" . . . . .	172,000.00	171,873.29
Acts 1931, Chap. 1, Item U, "Repairs and Improvements" . . . . .	8,600.00	8,599.57
Acts 1932, Chap. 69, Item H, "Certain Filter Beds" . . . . .	17,000.00	15,835.09

*Pondville:*

Acts 1929, Chap. 146, Item 598 } "Hospital Unit and Out-Patient Dept." . . . . .	109,500.00	109,400.78
Acts 1930, Chap. 115, Item 651 }		
Acts 1928, Chap. 127, Item 603 }		
Acts 1929, Chap. 146, Item 599 } "Additional Fire Protection" . . . . .	17,000.00	16,980.89
Acts 1930, Chap. 115, Item 653 }		
Acts 1930, Chap. 115, Item 652, "Recreation Building" . . . . .	7,000.00	5,699.96
Acts 1931, Chap. 245, Item 577A, "New Filter Beds" . . . . .	10,000.00	7,705.40

*Rutland:*

Acts 1929, Chap. 146, Item 594, "Water Supply and Sprinkler Heads" . . . . .	15,000.00	14,824.66
Acts 1930, Chap. 115, Item 643, "Hay Barn, Garage and Equipment" . . . . .	22,000.00	21,723.52
Acts 1930, Chap. 115, Item 641, "Medical and Surgical Building" . . . . .	35,000.00	34,881.42
Acts 1930, Chap. 115, Item 642, "Lightning Protection" . . . . .	6,000.00	5,014.16
Acts 1931, Chap. 268, Item 571A, "Cow Barn" . . . . .	25,000.00	24,982.43
Acts 1931, Chap. 245, Item 573, "Electrical Equipment" . . . . .	7,000.00	6,884.41
Acts 1932, Chap. 170, Item 554, "Medical Building Equipment" . . . . .	7,200.00	None

*Westfield:*

Acts 1931, Chap. 1, Item V, "Clearing Land" . . . . .	6,000.00	5,970.34
Acts 1931, Chap. 245, Item 575A, "Employees' Dormitory" . . . . .	79,500.00	69,464.52
Acts 1931, Chap. 245, Item 576, "X-ray and Other Equipment" . . . . .	6,000.00	4,548.73
Acts 1931, Chap. 245, Item 576A, "Additional Sewage" . . . . .	5,000.00	4,966.85
Acts 1932, Chap. 170, Item 556, "Equipment for Water Supply" . . . . .	1,500.00	1,476.43
Acts 1930, Chap. 115, Item 649, "Administration Building Alterations" . . . . .	3,800.00	3,702.42
Acts 1930, Chap. 115, Item 647, "Farm House Alterations" . . . . .	9,000.00	8,696.40
Acts 1930, Chap. 115, Item 646, "Superintendent's Residence" . . . . .	21,000.00	20,918.51
Acts 1929, Chap. 146, Item 596 }		
Acts 1930, Chap. 115, Item 645, "Water Supply and Fire Protection" . . . . .	21,900.00	21,739.10
Acts 1931, Chap. 245, Item 575 }		

*Receipts*

	Amount
Lakeville State Sanatorium . . . . .	122,044.67
North Reading State Sanatorium . . . . .	77,443.22
Rutland State Sanatorium . . . . .	220,524.34
Westfield State Sanatorium . . . . .	75,807.98
Pondville Hospital . . . . .	60,182.39

GEORGE H. BIGELOW, M.D.,

*Commissioner of Public Health.*

## REPORT OF DIVISION OF ADULT HYGIENE

HERBERT L. LOMBARD, M.D., *Director*

During the present year, the Division of Adult Hygiene has devoted approximately 90 per cent of its time to the cancer program, and the remainder to other chronic diseases.

## EDUCATION

During the year, the educational work has continued to expand. The Division had a health exhibit at the annual convention of the State Federation of Women's Clubs held at Swampscott in May. The Division also had active part in the National Conference of Social Workers at Swampscott in September.

Arrangements were made, in cooperation with the Division of University Extension, to continue the course on "Healthy Living." Adult Hygiene made out the program and attended to the details of this course.

More than seven thousand inches of newspaper publicity, exclusive of the Health Forum, have been received from the Clipping Bureau during the year. This is much more than the previous year.

The Health Forum is being published by fifty-three newspapers, and twenty-eight thousand inches of space were given.

Approximately twenty-one thousand pieces of literature have been distributed.

Eighty-eight lectures have been given, with a total attendance approximating twelve thousand. The Canti and Lewis films have been shown on nine occasions.

State clinic releases go out every other month to press chairmen of the various cancer committees. A general newspaper release goes out the alternate month to all newspapers in the State.

In order to interest young adults in the cancer problem, a series of lectures on cancer are being given to the biology classes in the colleges.

The nurses in the general hospitals have been sent literature in order to better acquaint them with cancer.

A delinescope film for small groups, especially foreign speaking, has been prepared.

The radio service continues active. There were 144 broadcasts in all. Forty-one of these comprise the series jointly sponsored by the Massachusetts Medical Society and this Department, and broadcasted by members of the Medical Society. The subjects covered are varied and aim to provoke interest in preventive and control measures. The importance of periodic medical examination is especially stressed.

Fifty-one broadcasts were given by the Divisional Directors or their appointees. This series was instituted, by request of the Station, to give much needed information about the various activities of the Department. For the past year these broadcasts have become broadened in scope to be educational, as well as informative.

Fifty-two were broadcasts of the Radio Health Forum. Each Forum consists of a timely foreword on some phase of public health, questions from the public, and the answers to them.

## STUDIES

The following studies were conducted during the year.

*Pneumonia Study:* The records obtained in the hospitals in 1931 have been tabulated and analyzed.

*Economics of the Cancer Program:* The records of the Massachusetts clinics and hospitals have been studied to determine the value of the service given.

*Social Workers' Studies:* Two studies have been made on records obtained by the social workers: one, a study of their failures; another, of the follow-up system.

*Chronic Disease Survey:* The material collected on chronic disease for the past three years has been analyzed and prepared for publication.

*Etiology of Cancer:* The study into the etiology of cancer has been made available through a grant of money from the Rockefeller Foundation. Records from cancer patients and controls are being obtained which will determine any causal relationship between cancer and environmental factors. In connection with this study, a thorough review of the literature is being made. The possible connection between cancer and tuberculosis is being studied.

*Hospital Admissions for Cancer:* The records from hospitals have been obtained comparable with those in 1925 so that comparisons can be drawn.



### TUMOR DIAGNOSTIC SERVICE

The routine work of the laboratory has continued as usual. There were 2,598 specimens received, an increase of 68 over the preceding year. Of these specimens 740 were derived from the Huntington Memorial Hospital, an increase of 32 over the preceding year. The remaining specimens were received from 96 hospitals and 228 surgeons.

The histologic grading of the epidermoid carcinomas of all sites, since the opening of the laboratory, is being carried on and is nearing completion. Owing to the increased interest in histologic grading this work has been felt necessary and should give valuable information as to the efficacy of this method of determining relative malignancy. In addition, studies of the various types of tumors of the skin, which make up a large part of the material received, are being conducted.

It is gratifying that the great bulk of surgical specimens received originates from the smaller hospitals and those portions of the State removed from medical centers. This shows that the laboratory is fulfilling its proper function in aiding the accurate diagnosis of cancer for those of our citizens who would otherwise be without satisfactory facilities for pathological diagnosis.

### SOCIAL SERVICE

During the year 1932, social service in the cancer clinics has been increasingly active, as the clinic attendance has increased. Because of the importance of prompt treatment after diagnosis, the social worker's chief aim has been to help the patient secure treatment as early as possible.

She has interpreted resources to him, and when family or financial problems have interfered with his acceptance of treatment, has helped him to work out some plan.

About 30 per cent of all patients coming to the clinics have needed social case work in varying degrees of intensiveness—arranging for hospitalization and convalescent care, making provision for the family while the patient is in the hospital, relieving him of worry which may impede his recovery, etc. The service has enabled many of the patients to accept treatment more promptly, or to continue treatment.

The attitude of the patient and his family and others, toward the disease, is of concern to the social worker who helps to create constructive attitudes.

Excluding the social work at Pondville, the clinic social workers had over five thousand interviews with the patient or his family or others interested in him, for the purpose of helping these individuals to a better understanding of the patient's medical social problem in order that the doctor's plan for him might be carried out most effectively.

Another seven thousand interviews had to do with the follow-up of the patient before or after treatment.

A study of all patients examined at the clinics during the five years showed that only a very small percentage failed to secure treatment recommended. This was undoubtedly due in large part to the efforts of social service.

The effectiveness of the clinics is increased by the fact that every cancer patient is followed up by the social worker as long as he lives, thus insuring continued observation or treatment in the office of the patient's own physician or in the clinic.

### CONFERENCES

A conference of the staffs of the State-aided cancer clinics was held in Worcester on December 7, 1932. On the same day there was a conference of the cancer clinic social workers and the Associate Cancer Educational Committees. A clinic was held for the clinic staffs, and medical papers were read. Dr. Frank E. Adair, Memorial Hospital, New York, and Dr. Henry K. Pancoast, University Hospital, Philadelphia, were among those present. Policies were discussed.

### WHITE HOUSE CONFERENCE

Early in the year the assistance of a "Steering Committee" was asked in guiding the Committee towards a permanent outcome of the year's work. A council was formed which is now functioning as "The Massachusetts Child Council."

An Institute, attended by approximately 250 people, was held in Worcester in June. The Committee's report for the year ending June 1, 1932, showed 365 talks arranged by the Committee in 105 communities.

## STATE-AIDED CANCER CLINICS

The Lynn Cancer Committee has been reorganized into a Cancer Association, supported in part by the Community Welfare Chest.

Social service has been temporarily discontinued in the Berkshire clinic.

A new policy of closer contact with the cancer clinics has been inaugurated. A physician from the Department visits each clinic bi-monthly, discusses the individual problems of the clinic, and brings ideas from the other clinics and the central office.

Cured Cancer Clinics were held in Boston on April 5th and 6th. At these clinics 228 cases of cured cancer were shown, and a program furnished for the visiting physicians and dentists. Among the speakers were: His Excellency, Joseph B. Ely, Governor of Massachusetts, His Honor, James M. Curley, Mayor of Boston, Dr. George H. Bigelow, Dr. Joseph C. Bloodgood, Dr. Arthur H. Estabrook, Dr. James Ewing, Mr. John Finley, Dr. William H. Gilpatric, Dr. William P. Graves, Dr. Robert B. Greenough, Dr. Timothy Leary, Dr. Channing C. Simmons, Dr. Halbert G. Stetson, and Dr. Simeon B. Wolbach.

The Massachusetts death rate, when adjusted for age and sex, has been practically stationary for the past five years, indicating the results of the program.

There was a 36 per cent greater attendance at general hospitals for cancer than in the five years previous. This is a much larger increase than is occurring in the hospitals throughout the country.

Table I. The attendance at the State-aided cancer clinics in 1932 was 3,427—an increase of 12.5 per cent over the preceding year. Cancer cases comprised 23.1 per cent of the total admissions. Seven hundred and ninety-three cases were seen—an increase of 17.8 per cent over the preceding year. Three hundred and three cases with precancerous lesions were seen—an increase of 42.2 per cent over the preceding year. While the total attendance has nearly tripled since 1927, the percentage of individuals with cancer has remained fairly constant, the lowest rate being 21.0 per cent in 1928, and the highest 25.4 per cent in 1930.

Table II. The number of cities and towns from which individuals came to the cancer clinics has gradually increased from 134 in 1927 to 227 in 1932.

Table III. The attendance at the Brockton, Lynn, New Bedford, Pondville, and Springfield clinics has shown considerable increases over their 1931 figures. Boston Dispensary, Newton, and Worcester North clinics were about the same, while the other clinics had lower rates. The highest percentage of cancers was found at Pondville and Worcester, the lowest at Worcester North, Springfield, and Berkshire.

Table IV. Both the duration before first visit to a physician and first visit to a clinic show an improvement in 1932 over the average of the preceding years. Total cancer cases are seeking the advice of a physician 0.6 months earlier and are coming to the clinic 1.6 months earlier. The improvement is best shown in cancer of the buccal cavity, although several other sites are favorable. While the interval before visiting the clinic is more favorable for breast and uterine cancer in 1932 than for the average of the preceding years, there are longer periods of delay before first consulting a physician.

Table V. This table shows the median duration of cancer symptoms before coming to the clinic for the years 1927-1932, sub-divided by whether or not the patients were referred by physicians. The group who consulted one physician and who were referred by him to the clinic had the shortest duration—9.1 months; those who consulted no physicians had the next shortest duration—11.1 months; those who consulted more than one physician and were referred by a physician—12.1 months; and those who had seen more than one physician but who were not referred by a physician—15.6 months. With the exception of cancer of the buccal cavity and cancer of other and unspecified organs, the group that consulted no physicians came at an earlier period. This emphasizes the value of publicity, but long durations indicate more must be done.

Table VI. In 1932, 42.6 per cent of the clinic attendance were referred by physicians, 25.2 per cent came because of newspaper publicity, 13.1 per cent came

at the advice of friends or relatives, and 20.1 per cent came for other reasons. There has been a steady increase of patients referred by physicians and a decrease in those coming because of newspaper publicity. Nearly two-thirds of the individuals with cancer and about one-half of those with precancerous lesions were referred by physicians.

Table VII. When sub-divided by different clinics, Lawrence, Lowell, Lynn, New Bedford, Newton, Springfield, and Worcester North show more patients are coming because of advice of their doctors. Berkshire shows a smaller percentage and the other clinics about the same. Brockton and Berkshire show the highest percentage coming because of newspaper publicity, with Pondville the least.

Table VIII. The reasons for coming to the clinic, sub-divided by types of cancer, indicate that skin cancers are referred by physicians less than any other type.

Table IX. Skin cancers comprise over one-fourth of the types of cancers seen at the clinics; breast and buccal cavity over one-sixth; and uterus about one-tenth. In 1932, the digestive tract furnished a much larger percentage than in preceding years.

Table X. Physicians were not consulted by 18.2 per cent of the patients in 1932. This percentage was slightly larger than in preceding years. Skin, breast, and other female genitals consistently showed higher percentages coming directly to the clinic than did the total group.

Table XI. Swelling, ulceration, pain, and discharge and bleeding were the principal symptoms that brought patients to the clinic. Over one-fourth of the cancer patients complained of pain. This figure should be reduced, as pain is rarely an early symptom of cancer.

Table XII. From an educational standpoint it is necessary to know what racial groups are attending the individual clinics. This, combined with the knowledge of the relative number in the community, can guide further activities with racial groups.

Table XIII. The opinion of the examining physician regarding the outcome of the clinic patients is shown in this table. The 1932 figures indicate that the physicians are classifying more cases in the possible cure and fewer in the probable cure than they did in the earlier years. The two groups with no hope for cure have about the same percentage of total cases in 1932 as in previous years, although they have increased the number that they felt might receive palliative measures.

Table XIV. About one-third of the patients seen at the clinics were advised to have operations, about one-half radiation, and a small percentage other advice. Radiation is apparently favored in all locations, with the exception of digestive tract, breast, and other and unspecified organs.

Table XV. This table shows where the clinic physicians advised patients to receive treatment. Slightly over one-third were referred to Pondville, slightly under one-third to local hospitals.

Table XVI. This table shows diagnosis of all patients coming to the clinic. The variations between the 1927-1931 average and 1932 are slight. Mastitis appeared in about 1 per cent of the admissions. Chronic cystic mastitis is a precancerous lesion and many of the mastitis group should be included among precancerous lesions, but it was impossible to determine the number.

This has been given a special classification.

Table XVII. Cancer morbidity, by occupation, is shown in this table. The population on which the rates are based is the clinic population, rather than a cross section of the community. Unskilled laborers and out-of-door workers have rates much higher than individuals leading sedentary lives.



TABLE I. — *Attendance at State-Aided Cancer Clinics*

	1927	1928	1929	1930	1931	1932
Attendance . . . . .	1,350	2,536	2,095	2,491	3,047	3,427*
Cancer . . . . .	305	533	519	633	674	793
Precancerous lesions . . . . .	88	281	232	194	213	303
Mastitis** . . . . .	15	56	37	36	36	26
Deferred diagnosis . . . . .	10	66	21	18	26	114
Undiagnosed . . . . .	14	47	30	37	50	27
No pathology . . . . .	94	109	93	132	154	167
Post-operative, no evidence of recurrence . . . . .	7	29	26	31	51	51
All other conditions . . . . .	817	1,415	1,137	1,410	1,843	1,947
Percentage with cancer . . . . .	22.6	21.0	24.8	25.4	22.1	23.1
Percentage with precancerous lesions . . . . .	6.5	11.1	11.1	7.8	7.0	8.8
Median age of total clinic attendance . . . . .	49.5	48.9	50.4	50.2	48.8	47.5
Median age of cancer patients . . . . .	60.5	61.1	62.3	61.5	60.9	60.6

\*One individual was diagnosed post-operative, no evidence of recurrence and precancerous.

\*\*An unknown percentage of mastitis belongs in the precancerous classification.

TABLE II. — *Residents of Massachusetts Cities and Towns Attending State-Aided Cancer Clinics*

	1927	1928	1929	1930	1931	1932
Number of places with 1 patient . . . . .	57	65	66	49	70	73
Number of places with 2-5 patients . . . . .	55	72	78	78	78	63
Number of places with 6-9 patients . . . . .	10	24	18	21	24	36
Number of places with 10 patients and over . . . . .	12	37	36	44	52	55
Total number of places . . . . .	134	198	198	192	224	227

TABLE III. — *Attendance at State-Aided Cancer Clinics, by Individual Clinic*

CLINIC	TOTAL ATTENDANCE*		PERCENTAGE CANCER	
	1931	1932	1931	1932
Berkshire . . . . .	80	69	20.0	14.5
Boston Dispensary . . . . .	201	204	35.3	27.5
Brockton . . . . .	293	349	13.3	16.1
Lawrence . . . . .	177	144	33.9	29.2
Lowell . . . . .	404	373	14.9	15.0
Lynn . . . . .	271	336	18.1	16.4
New Bedford . . . . .	163	223	22.1	22.4
Newton . . . . .	3	5	0.0	20.0
Pondville . . . . .	883	1,085	28.1	31.8
Springfield . . . . .	157	238	20.4	14.3
Worcester . . . . .	264	233	22.7	31.3
Worcester North . . . . .	177	181	16.4	13.8

\*Some individuals went to more than one clinic.

TABLE IV. — *Median Duration in Months Between First Symptom and First Visit to Physician and First Visit to Clinic, by Location of Cancer*

LOCATION OF CANCER	Median Duration Before First Visit to Physician		Median Duration Before First Visit to Clinic	
	Average 1927-1931	1932	Average 1927-1931	1932
Buccal Cavity . . . . .	5.3	3.8	9.6	6.0
Digestive Tract . . . . .	3.1	3.3	7.6	6.9
Respiratory System . . . . .	3.6	2.5*	7.7	5.5*
Uterus . . . . .	2.9	3.3	7.6	6.3
Other Female Genital Organs . . . . .	5.3	6.7*	11.2	13.5*
Breast . . . . .	4.6	6.1	8.9	8.0
Male Genito-Urinary Organs . . . . .	5.5	2.6	10.9	7.5
Skin . . . . .	12.7	12.5	24.9	24.2
Other and Unspecified Organs . . . . .	6.2	5.8	11.0	8.5
Total . . . . .	6.7	6.1	12.0	10.4

\*Based on less than 25 cases.

TABLE V. — *Median Duration of Cancer Symptoms before First Visit to Clinic, by Contact with Physician and by Location of Cancer*

1927-1932

LOCATION OF CANCER	REFERRED BY PHYSICIAN		NOT REFERRED BY PHYSICIAN	
	One Physician Consulted	More Than One Physician Consulted	One or More Physicians Consulted	No Physicians Consulted
Buccal Cavity . . . . .	6.1 months	10.6 months	13.0 months	10.5 months
Digestive Tract . . . . .	6.9 months	7.4 months	10.1 months	6.5 months
Respiratory System . . . . .	6.0 months	7.3 months	9.5 months	3.5 months
Uterus . . . . .	4.7 months	10.6 months	13.0 months	3.8 months
Other Female Genital Organs . . . . .	11.8 months	24.5 months	17.0 months	6.0 months
Breast . . . . .	7.7 months	12.4 months	10.9 months	6.3 months
Male Genito-Urinary Organs . . . . .	11.0 months	9.3 months	20.5 months	8.0 months
Skin . . . . .	22.0 months	Over 2 years	Over 2 years	18.9 months
Other and Unspecified Organs . . . . .	12.2 months	9.8 months	7.9 months	12.3 months
Total . . . . .	9.1 months	12.1 months	15.6 months	11.1 months

TABLE VI. — *Reason for Coming to Clinic, by Diagnosis*

Rate per 100\*

DIAGNOSIS		Physician	Friends and Relatives	Newspapers	All Others
Cancer . . . . .	1927	47.3	7.0	40.4	7.0
	1928	55.3	9.8	27.0	10.2
	1929	55.5	12.7	17.5	14.4
	1930	55.1	11.2	18.6	17.2
	1931	60.1	10.0	13.8	16.2
	1932	64.0	9.6	12.4	14.5
Precancerous lesions . . . . .	1927	10.5	8.1	74.4	8.1
	1928	25.3	11.2	54.1	12.6
	1929	31.6	14.3	43.3	10.8
	1930	43.8	15.5	25.8	19.1
	1931	40.8	14.1	27.7	17.4
	1932	49.8	12.2	23.8	16.2
Total attendance . . . . .	1927	20.1	9.3	64.9	7.1
	1928	29.2	14.8	45.6	13.3
	1929	34.0	17.2	35.5	13.9
	1930	35.8	15.9	31.7	19.0
	1931	37.9	14.1	29.8	18.9
	1932	42.6	13.1	25.2	20.1

\*Does not total to 100 per cent as some individuals gave more than one reason.

TABLE VII. — *Reason for Coming to Clinic, by Individual Clinic*

Rate per 100\*

CLINIC	PHYSICIAN		FRIENDS AND RELATIVES		NEWSPAPERS		ALL OTHERS	
	Average of Preceding Years	1932	Average of Preceding Years	1932	Average of Preceding Years	1932	Average of Preceding Years	1932
Berkshire . . . . .	22.3	15.9	15.6	15.9	58.8	66.7	14.6	20.3
Boston Dispensary . . . . .	23.8	26.0	18.9	16.2	6.6	9.3	51.0	49.5
Brockton . . . . .	20.9	22.8	10.6	9.5	62.0	60.5	7.6	9.5
Lawrence . . . . .	28.5	49.3	10.8	11.8	48.0	20.1	14.9	20.1
Lowell . . . . .	14.9	21.6	24.3	19.7	54.3	45.8	8.6	14.3
Lynn . . . . .	22.0	32.4	11.3	8.6	53.5	36.3	14.7	22.6
New Bedford . . . . .	32.1	55.1	11.4	10.8	43.8	22.9	13.7	11.7
Franklin County . . . . .	36.1	—	8.4	—	45.8	—	12.7	—
Newton . . . . .	37.5	60.0	8.3	20.0	29.2	0.0	25.0	20.0
Pondville . . . . .	66.9	67.6	15.5	13.6	4.3	0.3	14.2	18.6
Springfield . . . . .	13.9	25.2	14.6	16.4	59.6	47.5	12.3	10.9
Worcester . . . . .	37.6	37.8	5.1	6.9	37.8	17.6	20.8	39.0
Worcester North . . . . .	25.0	31.0	10.6	13.8	57.0	34.8	9.5	20.4
Total . . . . .	32.9	42.7	14.6	13.1	38.6	25.2	15.4	20.0

\*Does not total to 100 per cent as some individuals gave more than one reason.

TABLE VIII. — *Reason for Coming to Clinic, by Location of Cancer*  
Rate per 100\*

LOCATION OF CANCER	Physician		Social Worker		Nurse		Friends and Relatives		Clergy, Radio, Pamphlets		News-papers		Lectures		Past Experience		Dentist		Others	
	Aver- age 1927- 1931	1932	Aver- age 1927- 1931	1932	Aver- age 1927- 1931	1932	Aver- age 1927- 1931	1932	Aver- age 1927- 1931	1932	Aver- age 1927- 1931	1932	Aver- age 1927- 1931	1932	Aver- age 1927- 1931	1932	Aver- age 1927- 1931	1932	Aver- age 1927- 1931	1932
Buccal Cavity . . . . .	57.8	67.6	2.1	1.4	2.6	2.8	10.4	10.6	0.6	2.1	20.0	10.6	0.2	0.0	4.1	2.8	0.9	0.0	2.5	2.1
Digestive Tract . . . . .	59.8	75.2	3.6	3.3	0.8	0.8	13.2	6.6	0.8	0.0	10.4	5.8	0.0	0.0	9.2	7.4	0.0	0.0	2.8	1.7
Respiratory System . . . . .	58.5	71.4	4.9	0.0	2.4	0.0	9.8	0.0	0.0	0.0	19.5	0.0	0.0	0.0	7.3	14.3	0.0	0.0	0.0	14.3
Uterus . . . . .	73.9	70.6	4.7	2.7	1.8	4.0	5.8	5.3	0.0	0.0	12.7	6.7	0.0	0.0	2.2	6.7	0.0	0.0	0.0	4.0
Other Female Genital Organs . . . . .	66.7	57.1	4.4	0.0	2.2	0.0	4.4	21.4	0.0	0.0	15.6	14.3	2.2	0.0	2.2	7.1	0.0	0.0	4.4	0.0
Breast . . . . .	49.5	61.4	3.5	0.8	3.7	1.5	11.7	10.6	0.9	1.5	24.9	15.9	1.2	0.8	4.4	7.6	0.0	0.0	1.6	0.8
Male Genito-Urinary Organs . . . . .	77.2	69.3	0.0	3.8	0.0	0.0	3.5	19.2	0.0	0.0	7.0	3.8	0.0	0.0	12.3	0.0	0.0	0.0	0.0	3.8
Skin . . . . .	47.3	54.5	2.1	4.3	3.8	2.4	11.9	10.5	0.7	0.5	28.6	19.6	0.1	0.5	5.0	5.7	0.0	0.0	1.8	2.9
Other and Unspecified Organs . . . . .	55.9	63.0	4.0	5.6	3.4	0.0	7.9	5.6	0.0	0.0	20.9	11.1	0.6	0.0	4.5	9.3	0.0	0.0	4.5	5.6
Hodgkin's Disease and Leukemia . . . . .	65.5	61.1	3.5	0.0	0.0	0.0	10.3	11.1	0.0	5.6	6.9	0.0	0.0	0.0	13.8	22.2	0.0	0.0	0.0	0.0
Total . . . . .	55.6	64.0	2.9	2.8	2.9	1.9	10.4	9.5	0.6	0.9	21.3	12.3	0.3	0.3	5.0	6.4	0.2	0.0	2.0	2.5

\*Does not total to 100 per cent as some individuals gave more than one reason.



TABLE IX. — *Location of Cancer*  
Rate per 100

LOCATION OF CANCER	Average 1927-1931	1932
Buccal Cavity . . . . .	20.2	18.2
Digestive Tract . . . . .	9.5	15.5
Respiratory System . . . . .	1.6	0.9
Uterus . . . . .	10.5	9.6
Other Female Genital Organs . . . . .	1.7	1.8
Breast . . . . .	16.5	17.0
Male Genito-Urinary Organs . . . . .	2.2	3.3
Skin . . . . .	31.1	26.8
Other and Unspecified Organs . . . . .	6.8	6.9

TABLE X. — *Contact of Cancer Patients with Physicians, by Location of Cancer*  
Rate per 100

LOCATION OF CANCER	NO PHYSICIAN		ONE PHYSICIAN		TWO OR MORE PHYSICIANS	
	Average 1927-1931	1932	Average 1927-1931	1932	Average 1927-1931	1932
Buccal Cavity . . . . .	18.0	14.6	46.8	60.6	35.2	24.8
Digestive Tract . . . . .	7.7	6.7	46.1	45.8	46.1	47.5
Respiratory System . . . . .	15.0	0.0	27.5	66.7	57.5	33.3
Uterus . . . . .	5.6	6.7	55.6	68.0	38.8	25.3
Other Female Genital Organs . . . . .	19.0	21.4	54.8	35.7	26.2	42.9
Breast . . . . .	22.0	24.4	49.1	51.2	28.9	24.4
Male Genito-Urinary Organs . . . . .	7.0	19.2	38.6	50.0	54.4	30.8
Skin . . . . .	23.5	27.1	50.2	53.6	26.3	19.3
Other and Unspecified Organs . . . . .	13.0	13.0	51.7	40.7	35.3	46.3
Hodgkin's Disease and Leukemia . . . . .	10.3	41.2	38.0	35.3	51.7	23.5
Total . . . . .	17.4	18.2	49.0	52.4	33.6	29.4

TABLE XI. — *Symptoms that First Brought Patient to Clinic, by Diagnosis*  
AVERAGE 1927-1932  
Rate per 100\*

SYMPTOMS	Cancer	Precancerous Lesions	Total Attendance
Swelling . . . . .	38.4	29.2	36.8
Ulceration . . . . .	30.8	17.4	14.0
Discharge and Bleeding . . . . .	17.4	16.9	15.9
Pain . . . . .	28.4	20.2	38.5
Deformity . . . . .	4.8	18.8	7.5
Loss of Weight . . . . .	10.0	3.4	8.9
Malaise . . . . .	3.4	2.6	5.2
Observation** . . . . .	1.7	0.5	1.4
Itching . . . . .	3.5	5.4	3.7
Scaly Skin . . . . .	3.1	10.2	2.7
Others . . . . .	3.3	2.8	4.1
Unknown . . . . .	1.1	1.3	1.3

\*Does not total to 100 per cent as multiple symptoms were given by some patients.

\*\*Individuals who were previously treated and came to the clinic for observation.

TABLE XII. — *Nationality of Individual, by Individual Clinic*  
Average 1928-1932  
Rate per 100

CLINIC	United States	Ireland	Russia-Poland	Italy	Britain	Teutonic	Scandinavia	Latin	Canada	Baltic	Others	Unknown
Berkshire	72.3	4.8	3.0	3.8	3.3	1.8	1.3	2.3	5.3	0.3	0.5	1.5
Boston Dispensary	45.6	14.5	10.1	3.5	5.2	1.6	1.1	1.5	12.0	1.2	3.0	0.7
Brockton*	70.7	4.1	2.9	1.5	3.3	0.9	3.6	0.8	10.3	1.3	0.6	0.0
Lawrence	52.9	5.1	3.7	4.6	11.3	4.8	0.6	0.6	13.6	0.8	2.0	0.0
Lowell	50.0	8.2	3.0	0.4	5.4	0.8	0.7	4.6	24.4	0.6	1.4	0.5
Lynn	62.4	5.3	5.0	1.7	3.9	0.6	1.5	0.7	17.5	0.3	0.6	0.6
New Bedford	45.9	3.5	2.5	0.5	16.5	0.8	0.3	10.8	14.6	0.2	4.2	0.3
Franklin County**	81.4	1.8	3.6	0.6	4.2	2.4	0.0	0.0	4.8	0.6	0.0	0.6
Newton	44.4	13.9	0.0	8.3	5.6	0.0	5.6	0.0	22.2	0.0	0.0	0.0
Pondville	66.5	5.5	1.7	2.5	4.6	1.3	1.7	1.2	12.1	1.1	1.3	0.4
Springfield	66.0	6.9	4.7	1.6	4.9	1.7	0.8	1.0	10.6	0.6	1.1	0.2
Worcester	63.2	7.7	4.0	3.3	2.6	1.1	3.7	0.5	9.1	3.4	0.8	0.7
Worcester North	52.4	2.6	2.0	2.8	2.8	1.0	0.8	0.4	20.8	14.2	0.2	0.0
Total	59.4	6.2	3.4	2.1	5.6	1.3	1.5	2.2	14.6	1.9	1.4	0.4

\*Average 1930-1932 only.

\*\*Average 1928-1930 only.

TABLE XIII. — *Type of Cancer, by Location of Cancer and by Sex*

Rate per 100

LOCATION OF CANCER	Operable Cancer Probable Cure		Operable Cancer Possible Cure		Operable Cancer Palliative Measures Only		Inoperable Cancer	
	Average		Average		Average		Average	
	1927-1931	1932	1927-1931	1932	1927-1931	1932	1927-1931	1932
MALES								
Buccal Cavity . . . . .	44.7	47.8	23.5	30.8	12.3	15.4	19.5	6.0
Digestive Tract . . . . .	2.1	1.3	22.1	22.4	31.7	39.5	44.1	36.8
Respiratory System . . . . .	9.7	16.7	6.5	0.0	48.4	33.3	35.5	50.0
Breast . . . . .	16.7	0.0	0.0	50.0	33.3	0.0	50.0	50.0
Male Genito-Urinary Organs . . . . .	5.3	13.6	26.3	22.7	33.3	40.9	35.1	22.7
Skin . . . . .	81.0	71.8	12.4	22.6	4.0	3.2	2.6	2.4
Other and Unspecified Organs . . . . .	32.1	17.2	27.2	34.5	14.8	24.1	25.9	24.1
Total . . . . .	50.4	41.2	18.8	25.8	13.4	18.6	17.4	14.4
FEMALES								
Buccal Cavity . . . . .	64.8	55.5	23.9	33.3	2.8	5.6	8.5	5.6
Digestive Tract . . . . .	2.6	2.6	22.1	21.1	36.4	50.0	39.0	26.3
Respiratory System . . . . .	20.0	0.0	20.0	0.0	20.0	0.0	40.0	0.0
Uterus . . . . .	13.0	11.0	28.7	46.6	32.2	31.5	26.1	11.0
Other Female Genital Organs . . . . .	10.3	15.4	43.6	46.1	20.5	30.8	25.6	7.7
Breast . . . . .	25.5	19.2	36.8	40.8	19.8	20.8	17.9	19.2
Skin . . . . .	83.0	75.0	11.7	19.8	3.8	2.6	1.6	2.6
Other and Unspecified Organs . . . . .	35.0	31.6	22.5	31.6	16.2	21.0	26.3	15.8
Total . . . . .	38.3	29.8	26.4	34.8	18.2	21.8	17.1	13.6

TABLE XIV. — *Type of Treatment Recommended, by Location of Cancer*

1927-1932

Rate per 100

LOCATION OF CANCER	Operation	Radiation	Operation and Radiation	Observation	Study	Advice	Medical Treatment
Buccal Cavity . . . . .	33.3	52.9	8.7	1.4	0.8	0.5	2.5
Digestive Tract . . . . .	41.6	12.4	4.7	7.1	12.1	2.1	20.0
Respiratory System . . . . .	26.7	46.6	6.7	6.7	8.9	0.0	4.4
Uterus . . . . .	13.2	68.2	8.1	4.5	1.8	0.0	4.2
Other Female Genital Organs . . . . .	25.5	41.8	18.2	1.8	3.6	0.0	9.1
Breast . . . . .	55.3	29.7	10.6	1.3	1.3	0.0	1.8
Male Genito-Urinary Organs . . . . .	20.2	38.0	16.5	3.8	12.7	0.0	8.9
Skin . . . . .	33.1	60.7	5.0	0.6	0.3	0.1	0.2
Other and Unspecified Organs . . . . .	37.7	35.8	10.2	4.2	6.0	0.5	5.6
Hodgkin's Disease and Leukemia . . . . .	0.0	73.4	8.9	4.4	8.9	0.0	4.4
Total . . . . .	35.0	47.3	7.9	2.4	2.9	0.4	4.2

TABLE XV. — *Recommendation for Place of Treatment for Cancer Patients, by Location of Cancer.*

Average 1927-1932

Rate per 100

LOCATION OF CANCER	Pondville	Local Hospital	Other In- stitutions	Local Physician or Surgeon	Any Clinic	Unknown
Buccal Cavity . . . . .	41.6	21.2	9.7	12.8	13.8	0.9
Digestive Tract . . . . .	39.7	27.7	6.3	15.1	6.3	4.9
Respiratory System . . . . .	50.0	26.1	10.9	4.3	6.5	2.2
Uterus . . . . .	45.5	34.1	7.6	5.8	4.4	2.6
Other Female Genital Organs . . . . .	44.6	28.6	3.6	14.3	7.1	1.8
Breast . . . . .	35.6	38.4	6.4	13.7	4.6	1.3
Male Genito-Urinary Organs . . . . .	59.7	18.3	6.1	8.5	3.7	3.7
Skin . . . . .	26.8	24.7	11.7	14.8	21.7	0.3
Other and Unspecified Organs . . . . .	29.5	30.0	9.1	17.3	12.7	1.4
Hodgkin's Disease and Leukemia . . . . .	34.8	23.9	10.9	2.2	28.3	0.0
Total . . . . .	36.2	27.8	9.0	13.0	12.5	1.5



TABLE XVI. — *Diagnosis*  
Rate per 100

DIAGNOSIS	Average 1927-1931	1932
Cancer primary . . . . .	16.8	15.7
Cancer with metastases . . . . .	2.4	3.9
Cancer recurrent following operation . . . . .	2.4	2.1
Diagnosed non-cancer, later changed to cancer . . . . .	0.6	0.7
Cancer recurrent, formerly post-operative cancer . . . . .	0.2	0.1
Precancerous lesions changed to cancer . . . . .	0.3	0.2
Diagnosed cancer at death . . . . .	0.2	0.1
Hodgkin's Disease and Leukemia . . . . .	0.2	0.5
Post-operative cancer, no evidence of recurrence . . . . .	1.3	1.5
Benign tumors . . . . .	15.4	16.3
Precancerous lesions . . . . .	8.7	8.8
Diagnosed cancer, later changed to non-cancer . . . . .	1.6	0.7
Diseases of the digestive system . . . . .	9.1	8.9
Diseases of the circulatory system . . . . .	1.9	1.2
Diseases of the genito-urinary system . . . . .	5.5	6.4
Diseases of the respiratory system . . . . .	0.9	0.7
Diseases of the nervous system . . . . .	1.6	1.0
Diseases of the skin . . . . .	5.5	7.1
Mouth lesions . . . . .	2.2	1.8
Diseases of the bones . . . . .	0.6	0.2
Diseases of the eye and ear . . . . .	0.3	0.2
Tuberculosis . . . . .	0.5	0.7
Diabetes . . . . .	0.1	0.1
Pernicious anemia . . . . .	0.1	0.1
Rheumatism . . . . .	0.5	0.3
Goitre . . . . .	0.3	0.3
Syphilis . . . . .	0.4	0.3
Mastitis . . . . .	1.6	0.8
Undiagnosed . . . . .	1.5	0.8
Deferred . . . . .	1.2	3.3
No pathology . . . . .	5.1	4.9
Non-cancer, diagnosis not established . . . . .	7.2	0.9
All others . . . . .	4.0	9.7

TABLE XVII. — *Cancer Morbidity Rates, by Occupation*  
1927-1932

OCCUPATION	RATE PER 1,000
Professional . . . . .	115.0 ± 18.8
Sedentary . . . . .	153.0 ± 16.7
Housewife . . . . .	184.4 ± 4.6
Tradesman . . . . .	245.4 ± 20.7
Mill work . . . . .	249.1 ± 13.7
Public utilities . . . . .	322.2 ± 25.8
Skilled labor . . . . .	357.1 ± 16.4
Outdoor work . . . . .	430.8 ± 23.4
Unskilled labor . . . . .	446.5 ± 21.4

## REPORT OF DIVISION OF BIOLOGIC LABORATORIES

BENJAMIN WHITE, PH.D., *Director*ELLIOTT S. ROBINSON, M.D., PH.D., *Assistant Director*

The past year has been a satisfactory one in that the number of tests done by the Wassermann Laboratory has shown a further increase and in that the Antitoxin and Vaccine Laboratory has met successfully an unexpected demand for vaccine virus and has started distribution of a new product — diphtheria toxoid.

## I. ANTITOXIN AND VACCINE LABORATORY

The more important activities of the Antitoxin and Vaccine Laboratory may be summarized as follows:

1. *Distribution of Products*

	1928	1929	1930	1931	1932
Diphtheria Antitoxin, 1,000 unit doses . . . . .	319,516	315,441	264,378	212,601	195,648
Antimeningococcic Serum, 15 cc. doses . . . . .	3,482	4,413	5,433	3,577	3,530
Antimeningococcic Serum, 15 cc. doses (Conc.) . . . . .	—	18	158	115	—
Antimeningococcic Serum, bulk cc. . . . .	—	—	7,200	—	—
Antipneumococcic Serum, 100 cc. doses . . . . .	179	80	1	—	—
Antipneumococcic Serum, Conc. 15 cc. doses . . . . .	127	691	1,253	1,392	2,591
Antipneumococcic Serum, Lederle . . . . .	—	—	—	—	18
Smallpox Vaccine Virus, capillary tubes . . . . .	331,925	422,115	325,427	290,824	350,727
Typhoid-Paratyphoid Vaccine, 1 cc. doses . . . . .	104,117	85,681	93,788	94,635	88,908
Schick Outfits, 50 doses each . . . . .	5,752	6,428	8,481	8,503	7,748
Diphtheria Toxin (Bulk) cc. . . . .	475	785	1,000	175	265
Diphtheria Toxin-Antitoxin Mixture, 1 cc. doses . . . . .	361,130	357,944	419,347	474,881	420,003
Diphtheria Toxoid (Bulk) cc. . . . .	—	—	—	3,600	1,100
Diphtheria Toxoid 1 cc. doses . . . . .	—	—	—	—	1,557
Scarlet Fever Streptococcus Antitoxin, doses . . . . .	5,483	4,964	4,841	3,433	—
Normal Serum, cc. . . . .	148,100	647,365	175,970	51,375	31,395
Silver Nitrate Solution (ampoules) . . . . .	69,825	59,692	52,215	64,423	61,586
Anti-Measles-Diplococcus Serum, vials . . . . .	187	24	3	447	—
Influenza Serum, vials . . . . .	10	32	245	481	573
Tuberculin (ampoules) . . . . .	—	—	39	734	1,925
Tuberculin (Bulk) cc. . . . .	—	—	—	100	550
Sodium Citrate, vials . . . . .	—	—	—	1,563	896
Poliomyelitis Serum, vials . . . . .	—	—	—	—	714
Typhus Serum, vials . . . . .	—	—	—	—	40
Diagnostic Serum, cc. Pneumococcus I . . . . .	—	—	135	415	1,015
“ “ “ “ II . . . . .	—	—	85	290	975
“ “ “ “ III . . . . .	—	—	80	255	1,080
“ “ “ “ V . . . . .	—	—	—	—	325
“ “ “ Typhoid . . . . .	—	—	8	10	26
“ “ “ Paratyphoid A . . . . .	—	—	5	15	32.5
“ “ “ Paratyphoid B . . . . .	—	—	2.5	20	35
Arsphenamine 0.3 gram (ampoules) . . . . .	—	—	500	150	10
“ 0.4 “ “ . . . . .	—	—	273	384	590
“ 0.6 “ “ . . . . .	—	—	490	903	1,520
“ 2.0 “ “ . . . . .	—	—	100	25	—
“ 3.0 “ “ . . . . .	—	—	1,500	2,815	2,510
Sulpharsphenamine, 0.3 gram (ampoules) . . . . .	—	—	1,502	3,552	1,676
“ 0.4 “ “ . . . . .	—	—	1,504	1,688	1,526
“ 0.6 “ “ . . . . .	—	—	4,269	11,575	7,033
“ 1.0 “ “ . . . . .	—	—	743	1,591	1,108
“ 3.0 “ “ . . . . .	—	—	455	1,253	661
Neosarsphenamine, 0.45 gram (ampoules) . . . . .	—	—	4,419	10,228	8,606
“ 0.6 “ “ . . . . .	—	—	11,887	23,929	26,099
“ 0.9 “ “ . . . . .	—	—	3,303	8,649	9,203

(a) *Diphtheria Antitoxin*. — The distribution of diphtheria antitoxin has continually fallen since 1928, and this decrease, of course, can be accounted for by the decidedly lower prevalence of this disease in the State.

(b) *Antipneumococcic Serum*. — The production of antipneumococcic serum has been carried out under funds from an appropriation granted by the Commonwealth Fund of New York City and the distribution shows an increase of 1,200 vials over the previous year.

(c) *Smallpox Vaccine Virus*. — Owing largely to the outbreak of smallpox in Fitchburg, an unusually large number of doses were called for. Distribution for the month of January, which is usually about 22,000 doses, jumped to 81,172, most of which were supplied to Fitchburg and nearby communities within about ten days.

(d) *Diphtheria Toxin-Antitoxin Mixture and Schick Outfits*. — The distribution of diphtheria toxin-antitoxin mixture and of Schick outfits has diminished. This

fact is to be regretted, because the decrease means either that physicians and parents are developing a false sense of security, owing to the comparative absence of diphtheria, or else the usual efforts in promoting diphtheria prevention campaigns have slackened. It would seem that at this time more than ever there is a great necessity for expanding diphtheria prevention programs and for encouraging the use of diphtheria toxin-antitoxin among physicians throughout the Commonwealth.

(e) *Diphtheria Toxoid*. — This laboratory has been granted a license for the manufacture of diphtheria toxoid, and its distribution to physicians began during the year. At the present time the product is distributed only in 1 cc. doses and, because of the danger of reactions in children in the older age groups, precautions have been taken to insure its use with children under six years of age.

(f) *Scarlet Fever Streptococcus Antitoxin*. — Distribution of this product was stopped in 1931 because of failure to obtain a satisfactory potency. The difficulties in production have been largely overcome, and distribution will begin again shortly after the beginning of the year.

(g) *Tuberculin, "O. T."* — The distribution of Old Tuberculin for diagnostic purposes, begun in 1930, has more than doubled in the past year. This product is standardized on human beings and compares favorably with the standards set for other carefully controlled makes of this product.

(h) *Poliomyelitis Serum*. — Owing to the change in the policy of the Harvard Infantile Paralysis Commission, this Department has taken over the collecting of adult blood and blood from poliomyelitis convalescent patients and the serum has been processed in this laboratory and distributed to certain centers selected by the Commissioner. This product is sent out without any claims for its therapeutic efficiency.

(i) *Other Products*. — Distribution has remained at about the point reached in other years.

## 2. Expenses

YEAR	PERSONAL SERVICES		EXPENSES		TOTAL	
	Appropriation	Spent	Appropriation	Spent	Appropriation	Spent
1928 . . .	\$59,000 00	\$58,919 09	\$38,005 37	\$37,955 34	\$97,005 37	96,874 22
1929 . . .	63,400 00	63,392 26	39,560 48	39,261 97	102,960 48	102,654 23
1930 . . .	67,700 00	67,698 66	42,412 45	42,243 09	110,112 45	109,941 75
1931 . . .	71,000 00	70,984 35	42,556 90	42,504 57	113,556 90	113,488 92
1932 . . .	71,500 00	71,481 70	37,314 70	35,528 06	108,814 70	107,009 76

(a) Expenditures show a reduction not only below previous years but also substantially below the appropriation. This is in part due to somewhat lower prices, particularly for forage, and in part to lowered distribution with the accompanying lesser need for replenishments of stocks on hand. Neither of these causes is likely to prove permanent.

(b) *Sale of Products*. — The practice of former years has been continued, small amounts of surplus products being sold in order to maintain our license under the regulations of the United States Treasury Department.

## 3. Improvements

In addition to improvements in laboratory processes, some of which are mentioned below, the policy of maintaining buildings and equipment in good order has been continued. Hard surfacing of the road around the laboratory was undertaken to diminish the nuisance of mud and dust. The water supply in part of the stable and small animal rooms was vastly improved by replacement of old piping with new.

The need for new equipment has been less than usual the past year, although some new apparatus has been obtained to improve certain processes.



#### 4. *Personnel*

There have been no changes, so that the laboratory staff remains as last year with 1 director, 1 assistant director, 3 senior bacteriologists, 1 senior chemist, 1 assistant bacteriologist, 1 assistant chemist, 2 junior bacteriologists, 1 principal clerk and stenographer, 1 junior clerk and stenographer, 1 senior clerk, 3 laboratory assistants, 9 laboratory helpers, 2 janitors, 3 junior messengers, 1 stable foreman and 14 laborers. The personnel employed under the Pneumonia Service Fund consists of 1 senior bacteriologist, 1 junior bacteriologist and 3 laborers.

#### 5. *Education*

The demonstrations to nurses, college and medical school students were reduced in number because of the decision in the middle of the year to limit them to medical school students and public health nurses. In spite of this the attendance rose to 925. The course in Applied Immunology, given in connection with the Harvard School of Public Health, was held in March and two students of the Simmons College course in Public Health Laboratory Methods were given instruction.

#### 6. *Lectures and Addresses*

The Director and Assistant Director gave lectures and demonstrations in the course on Immunity at the Harvard Medical School, in the course given jointly by the Departments of Preventive Medicine and Pediatrics in the Harvard Medical School, and also in the courses for graduates of the same school. The laboratory has had many visitors from various parts of this country and from Australia, Canada, Hungary, India, Japan, Palestine, Rumania, Siam and Spain.

#### 7. *Investigations*

(a) The effect of additions of alum and calcium chloride to diphtheria toxin for immunization of horses has been further studied. This has led to the routine use of the calcium salt, with a large reduction in toxin doses and an appreciable increase in antitoxin titer.

(b) Mr. M. D. Orr of the Connaught Laboratories of the University of Toronto spent several months at the laboratory working on diphtheria antitoxin. Although it was impossible to complete these researches, much valuable fundamental work was undertaken. In this connection note should be made of the great value to the laboratory staff of the opportunity for contact with a worker of Mr. Orr's ability and experience.

(c) The Veldee method for testing the potency of scarlet fever streptococcus toxin and antitoxin has been tried out extensively. By its use the manufacture of scarlet fever streptococcus antitoxin has been made less a matter of luck and has put the laboratory in a position to distribute this product again.

(d) The pneumonia study has been continued on methods for improvement of the therapeutic serums. These efforts have been directed both toward improvement of the protection titer of the horses and toward more satisfactory methods for concentrating their serum. A method has been developed which may serve as a useful one for detection of those lots of serum which give rise to chill reactions when administered to human beings. In addition the chemical studies of pneumococci and their growth products are continuing. These researches are maintained chiefly by the grant obtained from the Commonwealth Fund of New York City.

(e) The laboratory has assisted the Division of Communicable Diseases by the processing of convalescent and other human serums for use in the control of communicable diseases.

(f) Dr. C. E. Keeler of the Bussey Institution has continued his work in blood groups in the rabbit. The share of the laboratory in this is limited to occasional advice and to the use of certain laboratory facilities.

(g) The Director on a leave of absence kindly granted by the Commissioner and the Public Health Council spent five weeks at the Bermuda Biological Station for Research. Working in collaboration with Professor Edward M. East of the Bussey Institution he carried out a study on the permeability of vegetable cell membranes. The data, while warranting no definite conclusions, apparently have opened the way to a possible field of study. This work will come to publication in the near future.

## 8. Publications

The following publications have appeared during the past year:

1. White, Benjamin, Bunney, W. E., and Malcolm, Wilbur G.: An improved diluent for diphtheria toxin in the Schick test. *Jour. Immunol.*, Vol. XXII No. 2, Feb. 1932, p. 93.
2. Robinson, Elliott S., and McComb, J. A.: Experimental and natural streptococcus hemolyticus infection of the udder of the cow. *Jour. Inf. Dis.*, Vol. 51, Sept.-Oct., 1932, pp. 292-297.
3. Malcolm, Wilbur G., and White, Benjamin: Studies on Meningococcus I. Endotoxin. *Jour. Immunol.*, Vol. XXIII, No. 4, Oct., 1932, p. 291.
4. White, Benjamin and Robinson, Elliott S.: Antimeningococcic Serum. Infections of the Central Nervous System. *Proc. Assoc. for Research in Nervous and Mental Diseases*, Vol. XII, 1932, p. 486. Williams & Wilkins Company, Baltimore.

## 9. Inspection

Dr. George W. McCoy, Director of the National Institute of Health of the United States Public Health Service, made the annual inspection of this laboratory on April 6. The United States Treasury Department license to manufacture and sell the present list of biologic products was continued.

## II. WASSERMANN LABORATORY

WILLIAM A. HINTON, M.D., *Chief of Laboratory*

## 1. Tests and Examinations

	1928	1929	1930	1931	1932
Wassermann Tests . . . . .	75,890	81,743	89,864	97,444	100,948
Kahn Tests . . . . .	2,694	3,594	3,822	12,735	15,059
Hinton Tests . . . . .	—	—	13,060	15,412	22,167
Modified Hinton Tests . . . . .	—	—	12,025	—	—
Gonococcus Fixation Tests . . . . .	1,793	2,498	2,790	2,560	3,195
Lange's Colloidal Gold Tests . . . . .	30	89	50	79	107
Complement Fixation Tests for Glanders . . . . .	36	23	30	32	27
Specimens of Milk Examined for Tuberculosis . . . . .	21	—	—	1	—
Agglutination Tests for Bacillus Abortus . . . . .	—	—	—	—	258
Diagnostic Examinations for the Division of Animal Industry:					
(a) Complement Fixation Tests for Glanders . . . . .	42	116	78	13	5
(b) Examinations for Rabies . . . . .	538	458	460	515	265
(c) Pathologic and Bacteriologic Examinations . . . . .	35	24	35	32	22
(d) Agglutination Tests for Bacillus Abortus . . . . .	783	4,383	8,643	8,966	10,077
(e) Specimens of Milk Examined for Tuberculosis . . . . .	—	—	52	—	—
Diagnostic Examinations for Lakeville State Sanatorium . . . . .	5	—	—	—	—
	81,867	92,928	130,909	137,789	152,130

The total number of tests shows an increase of ten per cent over last year. The only test showing a striking reduction in numbers is the examination for rabies, about half as many being done in 1932 as in 1931. The cost per test is again reduced, being now 14.2 cents as against 15.8 cents in 1931.

## 2. Expenses

YEAR	PERSONAL SERVICES		EXPENSES		TOTAL	
	Appropriation	Spent	Appropriation	Spent	Appropriation	Spent
1928 . . . . .	\$14,000 00	\$13,723 34	\$5,182 25	\$5,094 01	\$19,182 25	\$18,817 35
1929 . . . . .	15,800 00	15,328 92	5,300 00	5,297 13	21,100 00	20,626 06
1930 . . . . .	16,500 00	15,935 42	5,704 75	5,688 54	22,204 75	21,623 96
1931 . . . . .	16,600 00	16,591 76	5,213 34	5,213 34	21,813 34	21,805 10
1932 . . . . .	17,000 00	16,409 86	5,200 80	5,144 12	22,200 80	21,553 98

With an increasing volume of work, large reductions in expenditures can not be expected, so that the record for this laboratory remains a continuing source of satisfaction. The increased postage rate should also be borne in mind, for this is a considerable item for this laboratory.

In addition to the routine activities, the Wassermann Laboratory has furnished instruction in serological methods to men in the second-year class of the Harvard Medical School; to a special class of fourteen senior students from Simmons College; and to one man from the School of Public Health of Harvard University.

## REPORT OF DIVISION OF CHILD HYGIENE

M. LUISE DIEZ, M.D., *Director*

The activities of the Division of Child Hygiene for the year ending December 31, 1932, are outlined briefly in the following report.

### I. Activities of the Various Sections:

1. *Maternal, Infant and Preschool Hygiene:*
  - (a) Maternity Service
  - (b) Mothers' Classes
  - (c) Advisory Committee on Obstetrics
  - (d) Well Child Conferences
  - (e) Summer Round-Up
2. *School Hygiene:*
  - (a) Surveys
  - (b) School Hygiene Conferences
  - (c) High School Health Councils
  - (d) Hyannis State Teachers College
  - (e) Fitchburg State Teachers College
  - (f) Health Education Classes for Teachers
  - (g) General
3. *Public Health Nursing:*
  - (a) Reorganization of Nursing Program
  - (b) Tuberculosis Nursing
  - (c) Communicable Disease Nursing
  - (d) Nursing Club Activities
  - (e) Hospital Training School Courses
  - (f) University Extension Courses for Nurses
  - (g) Continuation Classes
  - (h) Nursing Standards
  - (i) Records
  - (j) Advisory Committee on Public Health Nursing
4. *Nutrition:*
  - (a) Emergency Nutrition
  - (b) School Lunches
  - (c) Nutrition Study at State Sanatoria
  - (d) Local Chest Clinics
  - (e) Lecture Courses on Nutrition
  - (f) Summer School Courses
  - (g) Summer Camps
  - (h) Consultant Service in Nutrition
  - (i) Nutrition Advisory Committee
5. *Dental Hygiene:*
  - (a) Underlying Trends
  - (b) Dental Project in Southern Berkshire Health Unit
  - (c) State Sanatoria Study
  - (d) School Dental Program
  - (e) Dental Advisory Committee
  - (f) Dental Hygiene Council
  - (g) Study Club for Dental Hygienists
  - (h) Association of School Dental Workers
6. *Health Education:*
  - (a) Pamphlets, Posters, Exhibits, etc.
  - (b) Publicity
  - (c) Library
  - (d) Lectures, Motion Pictures, etc.
  - (e) Prenatal and Postnatal Letters

### II. Special Projects:

- |                               |                           |
|-------------------------------|---------------------------|
| 1. May Day — Child Health Day | 4. Departmental News      |
| 2. 4-H Clubs                  | 5. White House Conference |
| 3. Tidings                    | 6. Staff Education        |

### III. Personnel of the Division.



## I. ACTIVITIES OF THE VARIOUS SECTIONS

**1. Maternal, Infant and Preschool Hygiene:***(a) Maternity Service.*

The demand for prenatal letters, fathers' letters, and letters on the care of the baby during the first two years, was greater this year than in 1931. At the close of the year there were on the registry for this service for all groups, over 21,900 names of persons, as compared with 17,200 for the preceding year.

Prenatal clinics at maternity hospitals have been visited from time to time and that at Northampton is active and showing progress.

*(b) Mothers' Classes*

Mothers' Classes have been held in several of the local communities as a result of stimulation on the part of the public health nursing consultants of the Division. In order to continue this educational project plans were made for the organization of Classes for Mothers of Preschool Children. A series of lessons was planned for the use of the local nurses conducting such classes and this is available for distribution.

Following the demonstration Well Child Conference held by the Division at the Reformatory for Women in Framingham, Mothers' Classes were formed and have created a great deal of interest among the mothers at the institution.

*(c) Advisory Committee on Obstetrics*

We have had several meetings with the Advisory Committee of the Obstetrical Section of the Massachusetts Medical Society, as a result of which standards for maternity nursing care have been drawn up and will be available shortly.

*(d) Well Child Conferences*

The five-year demonstration Well Child Conferences in Franklin County ended this year. This demonstration covered 25 towns, with a population of 33,791 (excluding Greenfield), served by 14 nurses. During the five years there were examined 4,032 well children, 638 of these in 1932.

During 1931 and 1932 the increasing number of families facing poverty due to unemployment made it increasingly difficult to accomplish the major aims of our teaching at these conferences; namely, proper feeding, correction of all remediable defects, and adequate prenatal care.

Outside Franklin County there were held 31 demonstration Well Child Conferences in 29 towns, and 1,110 children were examined by the pediatrician of the Division. Special accomplishment was felt to have followed the conferences held during the year, the establishment of permanent local Well Child Conferences resulting in 8 communities.

Of particular interest were the demonstration Well Child Conferences held at the Reformatory for Women in Framingham, at which 125 children were examined. Two conferences were held during the year, at a six months interval, and very definite gain was noted in the condition of the children at the second conference.

In one of the towns of the western district emphasis is placed on the annual physical examination of children from birth to school age, at the Well Child Conference. Close to 100 per cent of the children were examined and corrections of defects made through the efforts of the visiting nurses through home visits.

In another town in this district the public health nursing consultant of the Division was instrumental in securing a physician for attendance at the Well Child Conference held locally.

Of particular interest were the Well Child Conferences held on Martha's Vineyard, Nantucket and Cuttyhunk Islands. In Martha's Vineyard conferences were held in each of the 6 towns and 157 children examined — 92 children under five years of age, and 65 who would enter school for the first time in the fall. Unusual interest was shown in these conferences and every effort made to have all defects corrected.

At Nantucket the expense of employing a pediatrician for the examinations was covered by the Nantucket Public School Association, the other workers being supplied by the Department. There were 89 preschool children examined and 48 entering first-graders.

At Cuttyhunk the conference included as well the examination of the school children. A 100 per cent examination was done here for 14 school children and 8

infants and preschool children, and to all children on the Island with the exception of three the State District Health Officer administered toxin-antitoxin.

Dental examinations for the preschool children, and interviews with their mothers, have become an established part of the routine of the demonstration Well Child Conferences of the Department. Twice as many such examinations were given in 1932 as in 1931, yet we still find a high percentage with perfect teeth — 42 per cent in 1932 and 54 per cent in 1931. This is looked upon as a tangible result of the Department's general program of education in proper nutrition for prospective mothers, infants and small children. Of the communities studied the Island of Nantucket had the highest percentage of children with perfect teeth — 55 per cent.

(e) *Summer Round-Up.*

From the reports received, Summer Round-Up was held in 141 towns, at which a total of 9,850 children were examined. Of this number, 5,051 children showed physical defects and the total number of defects found was 11,248. The total number of children having defects corrected was 1,471, and the total number of defects corrected was 4,395.

## 2. School Hygiene:

(a) *Surveys.*

These school hygiene surveys are of value in stimulating local communities to strive for higher standards in school hygiene. During the year five such surveys were made.

(b) *School Hygiene Conferences.*

One series of school hygiene conferences was held during 1932. The program included for the fifth time demonstrations of satisfactory school health examinations. The feeling was that the 1932 conferences were the best series given thus far.

(c) *High School Health Councils.*

A particular activity in the school system this year was the promotion of High School Health Councils, in cooperation with the State Department of Education. Demonstrations of these councils were held at Yarmouth and Norwood High Schools. In addition to these Leominster and Nantucket were assisted in laying plans for theirs. The State Teachers College at Salem also organized a Health Council and found it most beneficial. Superintendents of schools and high school principals were circularized regarding the formation of such councils and an outline for their formation sent to each, in response to which over 200 requests were received for full information regarding the project and many requests received for talks before high school pupils regarding them.

(d) *Hyannis State Teachers College.*

The usual courses were given at the Hyannis State Teachers College during the summer, by a pediatrician of the Division, a consultant in public health nursing and the consultant in nutrition, and included special lectures on allied subjects.

It is agreed that this has been one of the most profitable projects undertaken by the Division, in cooperation with the State Department of Education. The teachers' groups, though small in numbers, are most enthusiastic, and the courses offered them in Personal and Community Hygiene, Physiology and Anatomy are meeting a decided need.

(e) *Fitchburg State Teachers College.*

A public health nutrition worker conducted the courses at the Fitchburg State Teachers College, as usual, this summer. There was an enrollment of 54 students at these classes, including teachers and nurses. Special emphasis was placed on low cost but well-balanced meals; making nutrition practical and attractive to the adolescent; opportunities and responsibilities presented to vocational teachers by the present economic stress.

The State Department of Education has prepared bound copies of this course.

(f) *Health Education Classes for Teachers.*

Classes for teachers were held in 18 towns, with excellent cooperation and interest in each. Since high school as well as elementary school teachers are included in these health education classes, the program required careful planning. In some communities these groups have held classes separately. The demand for such courses still continues.

*(g) General.*

The pediatrician doing the school hygiene work examined the children in the schools of Winchester, Nantucket, and Lynn High School, as a piece of special cooperation and study.

**3. Public Health Nursing:***(a) Reorganization of Nursing Program.*

The Department consultant in public health nursing reorganized the nursing program of the Department so that the public health nursing consultants of the Department are now carrying on the nursing work on a generalized plan.

*(b) Tuberculosis Nursing.*

Because of the change in organization of the work of the public health nursing consultants, making their program a generalized one, considerable time was spent in tuberculosis work. Visits were made to tuberculosis dispensaries, summer health camps, and to the local nurses doing tuberculosis work. Many conferences were held with the consultant in tuberculosis nursing in the Division of Tuberculosis with regard to program, active cases, contacts, and clinics. Special effort was made to extend the nursing services provided locally so as to include tuberculosis nursing and splendid cooperation was afforded by the county tuberculosis associations. Eight towns appointed part-time nursing service for follow-up on reported tuberculosis cases.

*(c) Communicable Disease Nursing.*

Under the generalized program of the public health nursing consultants time has been spent in securing toxin-antitoxin immunization in several communities, in some instances at the Well Child Conferences.

*(d) Nursing Club Activities.*

The various health clubs and health workers' associations were unusually active during the year. Monthly meetings were held with varied programs, planned in cooperation with the nursing consultants of the Department. Field visits were arranged with some of these clubs to the Children's Hospital, Massachusetts General Hospital and General Baking Company in Boston, and to the Middlesex County Sanatorium. The Blackstone Valley Public Health Club, since reorganization, includes lay as well as nursing groups, and meets in different sections of Southern Worcester County.

The Southern Berkshire Health Workers' Club was organized during the year and includes not only the Health District towns but those surrounding them.

*(e) Hospital Training School Courses.*

During the year much time was spent by the nursing consultants in conducting lecture courses on public health in the hospital training schools for nurses throughout the State. A total of 17 such training schools was reached.

*(f) University Extension Courses for Nurses.*

One of the public health nursing consultants has carried on two University Extension Courses for nurses, in Boston and Greenfield, under the auspices of the New York University and the State Department of Health of New York. Two-hour classes were held monthly for this purpose.

*(g) Continuation Classes.*

For those nurses who had taken the University Extension Courses the previous year, Continuation Classes were formed, to be held in Boston, Holyoke, Springfield and Worcester. Social hygiene was the main topic covered in these classes, and 65 nurses attended them. They were conducted by the same consultant who gave the Extension Courses.

*(h) Nursing Standards.*

In order to raise the standard of public health nursing great effort has been made on the part of the public health nursing consultants to urge those nurses now engaged in public health positions to complete their high school education. This necessitated many conferences with the State Department of Education to arrange for such nurses to continue their education locally or through correspondence classes. Twenty-five nurses have availed themselves of this privilege during the year.

*(i) Records.*

Definite progress was made during the year in securing the cooperation of local nurses in using the Daily and Monthly Report of School Nurse, a record form for



school nurses provided by the Department. A number have submitted their monthly reports to us and some have sent in an annual summary of their school nursing work.

(j) *Advisory Committee on Public Health Nursing.*

The Advisory Committee on Public Health Nursing was called to meet on one occasion during the year for the purpose of discussing nursing problems and also relative to filling the position of Department Consultant in Public Health Nursing made vacant by the resignation of Miss Mary P. Billmeyer.

#### 4. Nutrition:

(a) *Emergency Nutrition.*

This has been the keynote of nutrition work during the year. Necessity and publicity have aroused keen interest in foods at low cost as a safeguard for nutrition of children, pregnant women and other adults. Of particular note is the fact that many of the public welfare agencies have appealed to the Department Consultant in Nutrition for help in this problem for their recipients. One agency employed a nutritionist, following our demonstration, another is seriously considering employing one, and another community has secured the services of a volunteer nutritionist.

A noteworthy piece of cooperation on the part of the Department was that held in Fall River where we loaned the services of a nutritionist to assist in planning food at low cost sufficient to maintain health. Recipes and menus were prepared by the Division consultant in nutrition for the use of the foods provided through the Department of Public Welfare of that city. The City Welfare Department stood back of the plan, the board of health reported better health conditions, much money was saved and other Massachusetts towns, anxious to follow the lead of Fall River, are appealing to us for assistance.

Another piece of cooperation with an outside agency was that in connection with the offer of the Red Cross to distribute flour to needy families. This Division was appealed to for advice with regard to the use of this flour and recipes were prepared for making bread, biscuit, etc., for distribution to each person receiving the flour. Arrangements were made also that those needing help in cooking might get it locally through home economics teachers in the schools.

Thousands of copies of printed material on emergency nutrition and food allowances were distributed and the staff members concentrated on talks along this line during the year. Exhibits of low cost food materials were prepared for use in connection with talks given with regard to budgeting reduced funds.

It is the belief of the nutrition consultant that as a result of all this, education in nutrition has gone ahead probably two years instead of one.

(b) *School Lunches.*

We were helpful in establishing school lunches in three communities during the year — Hanover, Chester and East Longmeadow. In Hanover the Committee, consisting of the school principal, the nurse, and a representative of the parents, is functioning and we hope with such a committee to foster the continuation of proper school lunches.

(c) *Nutrition Study at State Sanatoria.*

At the State sanatoria for tuberculosis a special project with regard to food and its relation to carious teeth was conducted by a nutritionist of the Division. During the first year of this study the following accomplishments are evident: children have learned to eat new dishes with less difficulty; dental caries has been prevented and arrested by suitable dietary care; and children, staff and employees have had the benefit of nutrition teaching, directly and indirectly. A detailed report of this study will be prepared later.

(d) *Local Chest Clinics.*

The nutrition workers of the Division served the local chest clinics in Milford, attending 34 of their conferences, and nutrition service was given at 296 of the Chadwick Clinic conferences during the year.

(e) *Lecture Courses on Nutrition.*

Groups of nurses in Gardner, Lynn and Lowell, a group of nurses and social workers in Cambridge, and a group of social workers in Boston, each met for a series of four to nine talks on Food at Low Cost, in order that they might get practical information on emergency nutrition to bring to the families they contacted. The

Department consultant in nutrition gave the final talk in the Boston series. One hundred and twenty-six nurses and social workers took these short courses.

(f) *Summer School Courses.*

As reported previously the usual summer course in nutrition was given at Fitchburg State Teachers College by a nutritionist of this Division. Ten classes were included in this project and comprised teachers of continuation schools, day household arts schools, industrial schools, trade schools, evening schools, and school nurses teaching home hygiene. The students were keenly interested, particularly in the matter of planning well-balanced meals on low cost budgets, especially for those receiving public welfare aid.

(g) *Summer Camps.*

The consultant in nutrition, at the request of the Boston Health League, prepared a section on Food Economies for their pamphlet on "Health and Summer Camps", and amplified this leaflet in a talk to 25 camp directors on the need for camp dietitians, and this year's special need for well-balanced meals and nutrition education for children. Individual camp directors sought help on food budgets and assistance in securing camp dietitians.

(h) *Consultant Service in Nutrition.*

A number of the cities and towns asked for the services of the consultant in nutrition for guidance in preparing market orders suitable to maintain health, or to get the best returns for the limited funds at the disposal of the welfare agencies, for those obliged to seek public welfare aid.

(i) *Nutrition Advisory Committee.*

The Advisory Committee on Nutrition was called upon for two meetings during the year and their advice and assistance were most valuable, particularly with reference to the emergency nutrition work.

## 5. Dental Hygiene:

(a) *Underlying Trends.*

The basic thinking behind the dental health work for the past year has been that dental caries is a deficiency disease; that early and continuous care is necessary for the young child; and that care of the mouth in adolescence will prevent periodontal disease in an adult.

The need of proper nutrition for building teeth and protecting them against decay has permeated every phase of the work and changed many of our modes of attacking the problem.

Dental health work must become more and more closely integrated with the whole child health program. Physicians as well as dentists, nurses in all fields, as well as dental hygienists, welfare departments distributing food, as well as health departments giving dental care, agricultural extension workers as well as nutritionists, must combine their efforts. Our work in the rural areas last summer taught us that people must be encouraged to plant more tomatoes before they can feed them to their children to prevent tooth decay.

(b) *Dental Project in Southern Berkshire Health Unit.*

An outstanding accomplishment in dental hygiene was the dental hygiene program for the Southern Berkshire Health Unit. This was developed through cooperation with the Commonwealth Fund and is a combination of the best type of traveling dental clinic service for school and preschool children in outlying towns, and cooperative planning for clinic service for the needy children by the local dentists in the larger communities. The plan was developed by the Unit staff, the district dentists and the doctors working together. Because this service is self-supporting it can be offered to towns outside the Unit in other sections of the State. Previous to this year several of the towns covered had never had any type of dental care.

(c) *State Sanatoria Study.*

Mention is made of this study in another section of the report. However, it may be noted here that the hope that we might be able to arrest dental decay by improving the diet of the children in the State sanatoria for tuberculosis has been partly fulfilled. A member of the staff at Forsyth Dental Infirmary made three dental examinations at intervals of four months; a nutrition worker from the Division of Child Hygiene has carried on an educational program with the staff

and the children at the sanatoria, and extra foods have been added to the children's diets (mostly sources of Vitamin C), with the result that caries has been retarded in cases.

(d) *School Dental Program.*

The dental certificate program was carried on again in the schools, the certificates and dental honor rolls being provided by the Department to the local communities. The number of towns reporting upon children receiving dental care at clinics or by family dentists is as follows:

1928	1929	1930	1931	1932
<u>78</u>	<u>126</u>	<u>178</u>	<u>226</u>	<u>243</u>

In 1928 but 4 per cent of the children examined received dental certificates for completed dental work; in 1929 — 10 per cent; in 1930 — 18 per cent; in 1931 — 25 per cent; in 1932 — 25 per cent. The demonstration Well Child Conference of the Department is our best entering wedge in behalf of the dental clinic service for the preschool child, and this service is steadily growing in some communities.

The economic depression has begun to injure dental programs locally, especially in the large communities. Dental clinic service has been curtailed in some communities and completely abolished in three of the larger cities. The dental hygienist's program has been discontinued in one of the larger towns for the same reason.

An educational exhibit of maps showing progress in dental health work in the State was shown at the annual meeting of the Massachusetts Dental Society in Boston, and again at the annual meeting of the American Dental Association in Buffalo, New York.

(e) *Dental Advisory Committee.*

The Dental Advisory Committee has been called upon during the year to pass judgment upon the lessons planned for the Department's Outline for Classes of Mothers of Preschool Children, as well as other printed material on mouth hygiene. The Committee has been enlarged to include the Supervisor of Forsyth-Tufts Training School for Dental Hygienists.

(f) *Dental Hygiene Council.*

A combined meeting of the Dental Hygiene Council and Dental Advisory Committee was held for the discussion of the dental program of the Department, and valuable assistance was rendered through the sound judgment and constructive criticism of the members.

(g) *Study Club for Dental Hygienists.*

Informal study clubs for dental hygienists were formed in Springfield and Whitman, and at Easthampton the demonstration Well Child Conference was used as a teaching clinic for the local dental hygienist.

(h) *Association of School Dental Workers.*

Two meetings of this association were held during the year for the discussion of the dental hygiene program in the schools. The bulletin of the Association was issued only three times during the year.

## 6. Health Education:

(a) *Pamphlets, Posters, Exhibits, etc.*

Printed material distributed during the year totalled as follows:

Child Health Day material . . . . .	418,958 pieces
Summer Round-Up material . . . . .	95,097 "
Emergency Nutrition material . . . . .	69,700 "
All other publications . . . . .	634,894 "

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1,218,649 pieces

In addition to this there were 25,000 copies of The Commonwealth, the quarterly bulletin of the Department.

Our printed matter was requested by other states to the number of 450 requests, including one from Alaska. From Canada were 12 requests; 3 from England; 5 from the Philippines; 3 from Scotland; 2 from South Africa; 2 from Curacao, Dutch West Indies; 2 from Ukraine, United States of Soviet Russia; 1 each from New



South Wales, Japan, Venezuela, China, South America, Germany, Virgin Islands and Finland, a total of 37 from other countries.

Our library of reprints has been increased during the year. We have had several new publications and those needing reprinting have been revised. Much of the material distributed has been in connection with emergency nutrition, and welfare departments have been circularized with this material, as well as nursing organizations and health organizations.

The activity in the field of contacting schools with relation to health material, which had been discontinued because of the stress of other work, was resumed in October and since then a total of 127,396 pieces of printed matter was placed in the schools.

One achievement in the field of exhibits was the preparation of a complete exhibit showing the activities of the Department, for display at the annual meeting of the State Federation of Women's Clubs, held at Swampscott.

At Martha's Vineyard Agricultural Fair the Division held an exhibit of health educational material, at the request of the Fair officials, in which unusual interest was shown.

Various exhibits were planned for use throughout the State by the health workers' clubs, Mothers' Classes, teachers' classes, and other groups interested in this project.

The Department exhibits have been assembled on a complete unit basis for the purpose of demonstrating to local organizations how they can arrange such exhibits for their own use.

*(b) Publicity.*

Advance publicity was provided for all Well Child Conferences and splendid local publicity was secured through the efforts of our Health Education Worker. There were supplied during the year 52 news releases in addition to the 8 special releases on nutrition and a series of advance news releases and announcements for a special project of the Cape Cod Health Club.

Five State-wide releases were sent on Care of the Child During Summer, May Day—Child Health Day, Mothers' Day, Emergency Nutrition and the School Hygiene Conferences. In addition to these, two were prepared for the White House Conference and another health project.

Of special interest is the work for the local nurses with regard to their annual reports. Talks on good report writing were given in various sections, annual reports of visiting nursing associations were criticized and suggestions made for improvement. Several nurses have asked for this service, sending in their reports for criticism.

*(c) Library.*

During the year the completion of cataloguing the books and pamphlets in the library was effected and a catalogue is now available according to subject and author.

Meetings of the Library Committee were held for the consideration of the purchase of new books, journals and reprints.

*(d) Lectures, Motion Pictures, etc.*

During the year there were given 1,023 lectures and 153 radio broadcasts, by 157 speakers. Of the 355 communities in the State, 170 were contacted with such service, and 3 talks were given outside the State, at special conferences in Burlington, Vermont, Portsmouth, New Hampshire, and Philadelphia, Pennsylvania. Aside from radio listeners, approximately 39,187 persons were reached with this service.

Motion pictures were loaned to 100 communities and delineascope filmslides were loaned to 42 communities in the State.

Posters from the Department were used in 29 communities and a series of nutrition posters was made available for free distribution to the local agencies requesting them.

Exhibit material was shown in 47 communities throughout the State.

*(e) Prenatal and Postnatal Letters.*

During 1932 there were 5,830 new requests for prenatal letters and 6,669 new requests for postnatal letters. At the end of the fiscal year we carried on the registry

for this monthly service over 500 for the prenatal letters, 10,150 for the first year postnatal letter service, and 11,200 for the second year postnatal service. The letter to fathers was sent, as usual, to all families requesting the prenatal letters, a total of about 6,600 during the year.

## II. SPECIAL PROJECTS

### 1. May Day—Child Health Day:

In accordance with recommendations made previously this project during 1932 was sponsored in a much less degree by the Department but was made the responsibility of the local communities. We assisted by providing the usual merit tags and printed material. A news release was sent to the newspapers and this year, for the first time, we had a Proclamation for Child Health Day by the Governor of the State. Reports of Child Health Day activities were received from 133 towns as compared with 118 reports for 1931 and 182 for 1930.

### 2. 4-H Clubs:

For the 4-H Clubs, Charm Schools were held in 8 counties at which approximately 120 girls attended (16 to 21 years of age). At the first session they were scored as to food habits, posture and general charm, which included cleanliness, neatness, dress, etc. This activity was the result of combined effort on the part of the Extension Service, the State Department of Education, and this Department. The Club leaders were extremely pleased with the results and have asked for such Charm Schools for the older girls during 1933.

Another activity in this connection was participation in the health contest examination for 4-H Club children in Worcester County, for the third time. It was interesting to note that out of the six Charm School girls included in this health contest, the girl having the best health record was the one who had a very high charm score.

At Camp Gilbert, conducted for 100 of the older 4-H Club boys and girls, with a view to training them to be camp leaders, assistance was given for a period of two weeks. Suggestions for carrying on health meetings and outdoor cookery were the chief activities here.

### 3. Tidings:

Five issues of this bulletin were sent out during the year and we regret that it was considered necessary to suspend this because of budget limitations. It is felt that this informal magazine met a need and its reception by local school workers and other health workers has been gratifying. It is hoped that it may be resumed in the future.

### 4. Departmental News:

This too was issued five times during the year 1932, but it was decided that the number be reduced to four issues annually unless something of unusual importance was to be announced to the various divisions of the Department.

### 5. White House Conference:

During the year 164 talks were given on the recommendations of the White House Conference, by Department speakers. In this field it was possible to stress almost every phase of the health program and having the backing of that famous group lent particular importance to the subject discussed.

### 6. Staff Education:

Self-education courses were taken by two of the public health nursing consultants, on Principals and Methods of Teaching, at Boston University, and the course of the Department of Education on Methods of Teaching. Another of the nursing consultants took a course at Boston University on Progressive Teaching Methods.

One of the pediatricians took a course on Keeping Mentally Fit and another, a course on Causes, Treatment and Training of Crippled Children, both given by the University Extension Division of the State Department of Education.

A nutritionist took three courses, one on Supervision, at Boston University, the

New York University Extension Course on Social Hygiene, and a correspondence course with Columbia University, on Preventive Medicine and Public Health, given by Haven Emerson.

The librarian took a course on Manuscript Editing, through the University Extension Division of the State Department of Education.

### III. PERSONNEL OF THE DIVISION

It is with regret that we have to report the resignation of Miss Mary P. Billmeyer who served as the Department Consultant in Public Health Nursing. She accepted a position in the Division of Maternity, Infancy and Child Hygiene with the State Board of Health of Oregon.

Frederica L. Beinert was appointed as Public Health Nutrition Worker to fill the vacancy caused by the resignation of Mildred L. Swift who held the position temporarily.



## REPORT OF THE DIVISION OF COMMUNICABLE DISEASES

GAYLORD W. ANDERSON, M.D., *Director*  
NELS A. NELSON, M.D., *Assistant Director*  
ROY F. FEEMSTER, M.D., *Assistant Director*

## GENERAL STATEMENT

The year 1932 has seen a striking and continued decline in the toll from those diseases for which medical science has so far developed a rational line of attack. Notable in this group are diphtheria, pulmonary tuberculosis and typhoid fever, in all of which the case and death rates for 1932 have been lower than the previous record figures of 1931. Certain other diseases in which we are still groping for effective means of control have shown only such chance variations as may normally occur from year to year and in some instances have shown evidence of distinct increase.\*

## PREVALENCE OF SPECIAL DISEASES

*Anterior Poliomyelitis.*—Following the epidemic of this disease occurring during the late summer and early fall of 1931, the past year has been characterized by a most remarkable freedom from this disease. With only 61 cases and 13 deaths reported, infantile paralysis reached a level lower than that ever previously recorded. This virtual freedom from the disease in a year following an epidemic is particularly striking inasmuch as in all previous post-epidemic years the incidence has been appreciably above the mean and there has been a gradual decline in incidence to a minimum figure some two or three years after the epidemic year. The significance of this sudden decline within a few months is not clear.

In previous years this Department has cooperated with the Harvard Infantile Paralysis Commission in offering diagnostic assistance and convalescent serum to physicians dealing with pre-paralytic cases of infantile paralysis. Owing to the withdrawal of the Commission from this phase of the work it has been necessary during the past year for the Department to assume full responsibility for it. In order that the service might be continued with a minimum of delay, yet with a maximum of assistance to those physicians desiring the same, arrangements have been made for utilization of local facilities so far as consistent with the limited supply of serum. Small supplies of convalescent serum have been entrusted to some forty hospitals strategically located throughout the State, the supply of serum being replenished at the centers through the aid of the District Health Officers. These supplies have been made available for the use of any registered physician upon signing a card for the same. In addition, a field diagnostic service comparable to that maintained in previous years in conjunction with the Commission has been continued for the assistance of those physicians who preferred to obtain serum for pre-paralytic cases through this channel. The services of three part-time diagnosticians have been retained and 19 patients have been seen by them in consultation. It is apparent on the basis of a single year's experience that the majority of the physicians in the eastern half of the State preferred to obtain the assistance offered by these diagnosticians in dealing with cases of suspected pre-paralytic poliomyelitis.

In Fall River, Framingham and New Bedford local arrangements have been completed either through the board of health or the hospital for the maintenance of a comparable diagnostic service to serve that community or the area covered by the hospital in question. From the few trials that have been made of this organization, it would seem that this may be a reasonable solution for the vexing problem of making such service constantly available without at the same time unnecessary wastage of serum. It is hoped that this plan may be further developed in other communities, but there inevitably will remain certain sections in which this Department will be forced to continue the service which it now offers.

*Diphtheria.*—With 1,811 cases and 107 deaths reported as contrasted with 2,381 cases and 130 deaths for the previous year, diphtheria continued its rapidly downward trend, reaching a record low figure. It has been suggested in previous years

\*Beginning January 1, 1932, a slight change was made in the recording of cases of diseases dangerous to the public health hospitalized in neighborhood communities. This change permits of a more accurate allocation of certain cases according to community of apparent origin.

that the steady decline in diphtheria might not be continued and that we would shortly experience an upward trend. The year 1927 showed a distinct increase over the years 1925 and 1926, and 1929 showed an increase over the year 1928. Since 1929, however, there has been a constant and rapid decline in the incidence of this disease to the point where the case rate of 1932 was only 43 per cent of that of 1929 and the death rate only 40 per cent. As the year ends there is no evidence of any increase in the disease, the last part of the year having shown a much greater decrease over previous figures than did the first half. The current diphtheria record of Massachusetts is thus declining from the point of being one of the highest in the country to that of one of the lowest.

The immunization programs which have been maintained throughout the State by the local boards of health, in some instances with the assistance of this Department, have been continued in large part during the past year. Twelve communities which had previously taken no active steps toward immunization have conducted immunization clinics during the past year. This leaves only about fifty of the communities in this State which have so far failed to take active steps toward diphtheria control. Fortunately, most of these communities are extremely small, though the danger to the residents of these towns is just as great regardless of the size of the community. Notable among the new clinics conducted during the past year have been the active campaigns in Somerville and Taunton. This leaves the towns of West Springfield and Weymouth as the two largest communities which have failed to provide for diphtheria protection. In Athol and Lowell there have been evidences of an increase in diphtheria. In the former, active measures are being taken to combat this increase; in the latter there is at present no sign of any interest in maintaining the high level of protection which was attained for a few years through the energetic immunization programs of 1928 and 1929.

In spite of the encouraging decrease in diphtheria, which is unquestionably due in large part to the active immunization programs which have been carried on throughout the State, there still remains much to be done in this field. Immunization is still confined too largely to the school group, with a resulting neglect of the more important group of children under the age of five. Diphtheria immunization of children within the first year of life as a part of the normal care given at this time is not as yet as widely practiced as it should be. On the other hand, there are evidences of an increasing realization of the importance of early immunization for in the clinics during the past year the number of preschool children so protected has distinctly increased.

During the past year this Department prepared and distributed cards for the use of boards of health calling attention to the importance of immunization at this age. Many boards of health are making a practice of sending out these cards when a child has attained the age of six months. It is to be hoped that through the utilization of such cards there will be a greater appreciation on the part of the public of the importance of diphtheria immunization and that the public may, therefore, look more and more to the family physician for this service.

*Dysentery.*—Bacillary dysentery has, during the past year, assumed considerably greater importance than in previous years. It is becoming increasingly evident that many cases of what may be called gastro-enteritis, summer grippe, intestinal influenza, and the like, are in reality cases of bacillary dysentery. It is extremely hard with our present methods to obtain a very exact measure of the extent to which dysentery bacilli play a part in causing such infections. On the other hand, many cases of a very mild type of dysentery due to the Sonne strain have been recognized in some of the hospitals. In the State laboratory several fairly limited outbreaks have been shown to be due to the Hiss-Y strain. These outbreaks have been either institutional or confined to individual families. So characteristic are the latter that it is becoming fairly safe to presume that when severe gastro-intestinal disturbances follow progressively through several members of a family, the cases are in all probability due to infections with dysentery bacilli. In all such cases laboratory diagnosis is extremely uncertain owing to technical difficulties. Studies that are now being conducted by Dr. Feemster in connection with the bacteriophage give promise of offering considerable assistance along these lines. It is hoped that through a more intensive study and follow-up of such outbreaks more may be learned of their nature and possible methods of control.



*Epidemic Cerebrospinal Meningitis.*—The extremely low incidence of this disease in all sections of the country has been very marked in this State with only 83 cases and 34 deaths reported as compared with 101 cases and 30 deaths for the previous year.

*Influenza.*—A great freedom from conditions diagnosed as influenza has been experienced during the past year. The exact diagnosis of this disease is so uncertain and even so controversial that recorded figures are extremely unreliable. In the absence of rumors as to influenza epidemics, cases of so-called grippe are not recorded. When, however, the newspapers carry accounts of influenza in any section of the country, many of these grippe-like colds and other upper respiratory infections are immediately reported as influenza. As the year closes such reports are being received from the Southwest and far West, and there is evidence that this wave is approaching New England. It is, however, certain from the early reports the disease is extremely mild and in no wise resembles the influenza which was pandemic in 1918. As an index of the prevalence of upper respiratory conditions in a community, the Department has had the cooperation of several industries and educational institutions in reporting such conditions as well as absenteeism. In this way it is possible to measure the normal prevalence of such conditions so that the beginning of an epidemic wave of influenza or grippe can be readily determined. There was at no time any evidence of such during the past year.

*Malaria.*—Only 14 cases of malaria were reported as compared with 18 for the previous year. Of these one was therapeutic, one apparently contracted the infection within Massachusetts and the others were without doubt infected outside of the State. Unquestionably many cases of therapeutic malaria were not reported. They have, however, little if any public health significance.

*Measles.*—During 1932, 19,763 cases of measles and 64 deaths were recorded, thus equalling the record low death rate of measles recorded for the previous year. The disease was particularly prevalent in the Merrimack Valley, and during the spring spread from a focus in Franklin County downward through the Connecticut Valley. There was also an increased prevalence in the southeastern section of the State. As the year closes two foci of abnormally high incidence exist in Holyoke and Maynard. There is also some evidence of a beginning increase of the disease within the Metropolitan Area.

*Pneumonia, Lobar.*—The decline in the death rate from lobar pneumonia which has been noted for a number of years, continued during 1932 with only 1,688 deaths recorded as contrasted with 1,718 for the previous year. This brings the 1932 rate to the lowest level ever recorded.

*Psittacosis.* Two cases of psittacosis, one of which was fatal, occurred in the same household in Malden. The infection was contracted from parrakeets purchased in a department store, the birds in question having originated in Southern California. Investigations in California by the United States Public Health Service showed that the birds of this aviary were heavily infected and had caused human cases elsewhere in the country. Three shipments of parrakeets from California were reported to the Department as apparently infected. In all cases the remaining birds were destroyed. Rigid restrictions adopted by the United States Public Health Service regulating the interstate shipment of birds of the parrot family, should tend to protect the country against infection by birds from many of the California aviaries which are known to be infected. Similar protection against introduction of the infection from abroad was provided in the federal importation regulations of January, 1930.

*Rabies.*—For the first year since 1926 there have been no human deaths from rabies. During the first part of 1931 there was an abnormally high prevalence of rabies in this State. A sincere endeavor was made during the summer of 1931 to induce communities to take steps against a wider spread of the disease through the use of restraining orders. Although the cooperation obtained was somewhat indifferent in some sections of the State, rabies showed a striking and remarkable decline beginning with September of 1931 and during the past year has continued at the lowest level that has been recorded for a number of years. It is, of course, impossible to determine to what extent this decline has been due to the increased interest which was aroused over a year ago. It is, however, rather evident that



many boards of health are distinctly more interested in the problem of rabies control. It is becoming increasingly apparent, however, that in order to achieve some degree of permanent control it will be necessary to devote increasing attention to the importance of actively immunizing dogs against rabies through annual injections. Such a method, while not completely effective in every instance, does confer a fairly high level of protection and makes a distinct appeal to the dog owner who is anxious to protect his animal from the disease, as well as to protect the public against the very occasional cases of human rabies. Public clinics for the immunization of dogs against rabies were conducted during the past year in Belmont, Framingham, Natick, Watertown and Wellesley. The procedure seems entirely sound in principle, though its extension in practice will for some time be curbed through the necessity of retrenchment in municipal expenses.

A distinct contribution to the prevention of human rabies was made by the enactment of a law by the 1932 Legislature whereby any person who in the opinion of this Department is in need of antirabic treatment is provided with the vaccine by the local board of health, which in turn is reimbursed for the cost of the same by the county treasurer from funds received from the dog taxes. This act has thus removed the occasionally troublesome situations that have arisen in the past when the individual has felt unable to pay for the vaccine and the board of health has been unwilling to furnish the same, with the result that treatment has often been dangerously delayed. This law likewise corrects the previous inconsistency whereby the money from the dog taxes was used only to pay for certain types of property damage done by dogs and no provision was made for personal damage.

*Scarlet Fever.*—With 16,580 cases and 145 deaths recorded for scarlet fever, this is the highest level it has attained for some years. This is the greatest number of cases ever reported and the greatest death rate recorded since 1927. Fortunately, the majority of the cases have been mild, so that the case fatality rate has been low. On the other hand, in spite of the relative mildness of most of the cases, many of these do develop complications which may be serious and are in any case distressing. The burden experienced by the boards of health in caring for these cases has been greatly increased during the past year, so much so that extra appropriations have been required in many instances. The cost of the hospitalization of such cases has been one of the most troublesome burdens of many boards during the past year. It is thus apparent that both from the humanitarian standpoint and from the point of view of reduction of expenditures it is becoming increasingly important that a rational and effective mode of scarlet fever control be developed. Work of the United States Public Health Service, in which this Department has furnished some assistance, has shown encouraging results in the direction of the development of scarlet fever immunization, which might be practical on a community basis. Attempts have been made in certain cities, both in Massachusetts and elsewhere, to measure the effective quarantine period in terms of the individual case, as has been done for many years in diphtheria. The uncertainty of our knowledge of hemolytic streptococci renders this difficult, but it is becoming apparent that little is being gained from the extremely long quarantine of many cases of scarlet fever and that a somewhat shorter period varied according to the individual case may be equally effective. It seems reasonable to expect that the next few years may see outstanding developments in methods of scarlet fever control, which are at present extremely crude.

*Septic Sore Throat.*—Only one outbreak of septic sore throat was recorded during 1932. In the town of Topsfield 20 cases and 3 deaths occurred among twenty-five persons known to have consumed the milk from a single cow. This animal was grossly infected. Hemolytic streptococci were recovered from the throats of the patients, from the milk of this animal, from the udder when opened at autopsy and likewise from the throat of the milker, who had continued apparently well. This outbreak illustrates in striking fashion the danger that can exist with the small and unsupervised one-cow dairies.

The remaining cases of septic sore throat of the 232 that were reported for the State were all sporadic.

*Smallpox.*—During the first of the year an outbreak of 60 cases of mild smallpox occurred in Fitchburg. Because of the relative mildness of the cases, it is likely that many other cases occurred which were not brought to official attention. The

Fitchburg Board of Health ordered vaccination of all residents of the city, in the carrying out of which this Department rendered considerable assistance. Investigation failed to show the exact source of infection of the first case, inasmuch as this individual had been travelling throughout New England. The subsequent cases occurred almost exclusively among the Canadian-French inhabitants either of preschool age or those who had come to this country from Canada after school age and therefore had not been reached by our present compulsory vaccination laws. The following table shows the remarkable protection that was enjoyed by those residents of Fitchburg that had been previously vaccinated:

	Number of Persons	Number of Cases of Smallpox	Case Rate per 100,000 Population
Unvaccinated . . . . .	5,457	57	1,048
Vaccinated over 40 years prior . . . .	4,926	3	61
Vaccinated during past 40 years . . . .	29,558	0	0

The only spread of the disease from Fitchburg was to a private school in Worcester, attended by two of the cases. Although all the pupils here were vaccinated on first suspicion of exposure two boys were overlooked, both of them subsequently developing smallpox.

Two cases of smallpox occurred in Pittsfield, contracted in all probability through contact with cases from Bennington, Vermont, which city was hardly ever free of smallpox during the entire winter of 1931-32. One case of smallpox in Boston obtained its infection from a relative in New Hampshire, who was in turn infected as a part of the outbreak of smallpox in Bridgeport, Connecticut, in the latter part of 1931.

*Tuberculosis, Pulmonary.*—With only 3,994 cases and 2,041 deaths reported, as contrasted with 4,421 cases and 2,306 deaths for 1931, pulmonary tuberculosis reached the lowest level ever recorded in this State. This low level of both cases and deaths is of particular interest in view of the present economic stringency.

*Typhoid Fever.*—The striking decrease in typhoid fever recorded during 1931 continued during the past year, with only 214 cases and 25 deaths reported as compared with 250 cases and 30 deaths for 1931. This is not only the lowest figure ever recorded for this State, but is also one of the lowest, if not the lowest death rate ever recorded in this country for any state. In the last year's report it was stated that the decrease in typhoid for that year was due both to an unusual freedom of outbreaks of any magnitude and to an actual decrease in the endemic incidence of the disease. During the past year there were about the same number of cases due to outbreaks as in the previous year, so that the decrease can be truly said to have been due to an actual decrease in the endemic prevalence. Such a decrease is to be expected, in view of the fact that the progressively lower rate of typhoid for several decades means that the number of unrecognized carriers in the population is each year becoming smaller as more die in a single year than are being produced.

Of the 214 cases reported, the source of infection was found in 51 instances. This is slightly in excess of the proportion found for the previous year. As the number of outbreaks of any magnitude decreases it becomes, of course, increasingly difficult to find the source of infection of any great number of the total cases. It is therefore interesting and pleasing to note the number of typhoid carriers which may be found in connection with the investigation of the cases that occur. The following table shows that during the past year the District Health Officers have been unusually active and successful in discovering typhoid carriers who have caused infections:

Year	Cases of Typhoid	Carriers Added to List	Rate per 100 Cases	Carriers Found in Investigation of Cases	Rate per 100 Cases
1928	310	7	2.3	7	2.3
1929	307	6	2.0	4	1.3
1930	318	9	2.8	5	1.6
1931	250	6	2.4	4	1.6
1932	214	13	6.1	10	4.7



Of the 51 cases in which the source of infection was found, 18 per cent were due to milk, 53 per cent to carriers and 29 per cent to contact with another case of typhoid fever.

As was noted from the table, thirteen new carriers were added to the list during the year, bringing the present total to seventy-three. Ten of these were found in connection with the investigation of cases, one was discovered through examination of specimens obtained during convalescence, and two moved in to the State. Two persons on the carrier list died during the year and two more were removed from the list as cured through removal of the gall bladder. The number of persons on the carrier list at the end of the year is thus seventy-three.

The occurrence of several cases of typhoid fever which could be traced to previously recognized and now uncooperative carriers has served to focus attention upon the fact that in some instances more effective measures for their supervision are necessary. In the town of Palmer a single carrier, recognized as such for the past four years, has during that interval caused twelve infections, two of which were fatal. The care of these cases has cost the town approximately \$3,000 for hospital bills. In Milford an eight year old boy, a carrier since the age of four, has caused six infections, three of them during the past year. Because of his age he is unfortunately unable to appreciate the seriousness of the situation. Another carrier apparently infected two persons who shared a summer cottage with him, unaware of his carrier condition. An attendant in a children's institution, found to be a carrier and assigned to purely cleaning duties, was apparently so little impressed with the seriousness of her condition that she continued to handle food, thus causing five additional infections. In the latter case there will probably be the utmost cooperation in the future. From the others, however, it seems extremely unlikely that we can expect anything other than cases recurring from time to time, all due to the same source, unless more energetic control measures can be instituted. Gall bladder removal has been offered in all cases and in each instance refused.

During the latter part of the year cholecystitis of typhoid origin was declared by the Public Health Council to be a disease dangerous to the public health. This action was taken so as to clarify the position of a board of health with respect to its authority to regulate typhoid carriers on the same basis as it would regulate other sources of human infection. This method of procedure seemed preferable to an attempt to attain additional legislation which would authorize a board of health to act more vigorously than has been possible under the existing statutes.

The death of a student nurse from typhoid fever during the first part of the year focused attention upon the fact that in many hospitals the routine immunization of all nurses against typhoid is being neglected. This matter was called to the attention of all hospital superintendents at that time. In spite of the warning, certain hospitals still fail to protect their nursing staff, as evidenced by the development of two more cases of typhoid among student nurses in different hospitals during the latter part of the year. This matter has again been brought to the attention of hospital superintendents. That a hospital should fail to protect its staff against a disease which is so readily prevented cannot reflect creditably upon the hospital management.

*Undulant Fever.*—Fifteen cases of undulant fever were reported during the year. It is extremely uncertain as to the exact prevalence of this disease. That it should be more prevalent in certain sections of the State than in others is probably explainable by the fact that the physicians in that section are more alert for its detection rather than that special local circumstances have made it more frequent of occurrence. The widespread prevalence of contagious abortion of cattle and the still rather high consumption of raw milk in many parts of the State can only mean that many cases of the disease occur which go unrecognized. It is extremely unlikely, however, that the incidence of the disease will ever reach the high levels recorded for the Midwestern States inasmuch as about 85 per cent of the total milk supply is pasteurized and the raising of cattle and swine is not a major industry.

*Whooping Cough.*—There were 7,881 cases and 107 deaths reported as compared with 7,174 cases and 88 deaths for the previous year. From the present state of our knowledge with regard to whooping cough there appears to be little prospect



of effectively controlling this disease within the near future. The most effective attempts of control rest in educational efforts designed to prevent the deaths that occur among infants.

#### OUTBREAKS

*January.*—Gastro-enteritis, Boston. Outbreak following a fraternity dinner. 27 of the 35 guests affected. Not traced to any one article. 27 cases; no deaths.

*January-February.*—Smallpox, Fitchburg. 60 cases occurred in part of city least protected by previous vaccination. 36 cases officially reported; no deaths.

*January-March.*—Gastro-enteritis, Northampton. Two explosive outbreaks of food poisoning in a girls' college. Specimens obtained from food handlers and patients still ill showed organisms of the dysentery group. Source unknown.

*March.*—Gastro-enteritis, Deerfield. About 40 cases developed in private school using a private water supply, which had been previously found unsafe.

*April.*—Septic Sore Throat, Milk-Borne, Topsfield. Of 25 persons using milk from a single cow, 20 developed septic sore throat and 3 died. Hemolytic streptococci were obtained from the throats of 15 of the cases, the throat of the milker and the milk from the diseased quarter of the cow's udder. 20 cases; 3 deaths.

*April.*—Gastro-enteritis, Milk-Borne, Ipswich. 16 persons from 3 separate yet related households were affected. Only factor in common was that all obtained milk from the two cows at one of these homes. Milker was the first victim and continued to handle milk during illness. 16 cases; no deaths.

*April.*—Gastro-enteritis; Somerville and vicinity. Numerous cases of food poisoning reported from Chelsea, Cambridge, Somerville and Wakefield following the consumption of chocolate eclairs produced by a single bakery in Somerville. No organisms discovered.

*May.*—Typhoid Fever, Worcester. 5 cases of typhoid fever occurred at the State Hospital. A cook in the main kitchen was found to be a carrier. 5 cases; 2 deaths.

*June.*—"Sore Throat"; Lincoln. Some 15 or 20 cases of sore throat occurred among children in a health camp.

*June.*—Gastro-enteritis, Woburn. Number of cases occurred. Possibly connected with the water supply.

*June-November.*—Dysentery, Medfield. Numerous cases of dysentery among inmates of State Hospital. A dysentery organism of the Hiss-Y strain isolated.

*July.*—Typhoid Fever, Taunton. 5 cases occurred in two related families. Source of infection not found. 5 cases; no deaths.

*August.*—Scarlet Fever, Milk-Borne, Brockton. Due to milk possibly unpasteurized and infected either by milker who was known to have scarlet fever or by pasteurizing plant operator likewise found to have scarlet fever. 8 cases; no deaths.

*August.*—Septic Sore Throat, Williamstown. 7 cases occurred among guests and employees of two hotels. Hemolytic streptococci found in cultures from the throats of two of the patients. Source unknown. 7 cases; no deaths.

*August.*—Dysentery, Georgetown. Family outbreak of 7 cases with 1 death. Dysentery organisms isolated. Well water suspected. 7 cases; 1 death.

*October.*—Psittacosis, Malden. 2 human cases of psittacosis with 1 fatality occurred. Examination of the parrakeet showed "probable psittacosis". 2 cases; 1 death.

*October.*—Gastro-enteritis, Sturbridge. Explosive outbreak of gastro-intestinal disturbances limited to users of water supply. Water found to be dangerously polluted.

*October.*—Gastro-enteritis, Williamsburg. About 200 cases of gastro-intestinal disturbance occurred. Water supply suspected.

*November.*—Gastro-enteritis, Danvers. Number of cases of gastro-intestinal disturbance prevalent in State Hospital. Dysentery bacillus of the Hiss-Y type was isolated from one of the patients.

*November.*—Gastro-enteritis, Medfield. An explosive outbreak of diarrhea occurred in the State Hospital. About 300 inmates were affected. Meat loaf suspected.

*December.*—Dysentery, Fall River. An outbreak of bacillary dysentery apparently spread through contact. 20 cases or more among several families; no deaths.

## GONORRHEA AND SYPHILIS

During 1932, 1,058 physicians reported either gonorrhea or syphilis or both. These constitute 17.6 per cent of the 6,009 physicians known to the Department. They number 34 less than the 1,092 who reported in 1931. Gonorrhea was reported by 846 (14.1 per cent) and syphilis by 442 (7.4 per cent) as compared to 15.7 per cent reporting gonorrhea and 9.1 per cent reporting syphilis in 1931. Of the 1,058 reporting, 278 had not reported either disease previously (26.3 per cent of those reporting.) During the three years of reporting directly to the State Department of Public Health 1,783 physicians have reported either disease or both at one time or another, approximately 29.7 per cent of the physicians in the State. Evidence is accumulating which indicates that 46 per cent of the physicians in the State treat gonorrhea and 40 per cent treat syphilis, and that 50 per cent treat one or the other. It is apparent, therefore, that reporting as yet is by no means complete.

There was a decrease in cases of gonorrhea reported from 7,201 in 1931 to 6,738 in 1932, but an increase in the number of cases of syphilis reported from 4,447 in 1931 to 4,530 in 1932 (Table XII). Cases of gonorrhea reported by clinics increased only by 53 over 1931; those reported by institutions increased 159; while cases reported by physicians decreased 663. Thus the decline in reported cases of gonorrhea has taken place entirely among those reported by physicians. Either physicians have failed more generally to report this year or their patients are under no medical supervision, since they have not been absorbed by clinics. Cases of syphilis reported by clinics increased 107 over 1930; those reported by institutions increased 243; while those reported by physicians declined 269. Again the loss in cases reported by physicians has not been absorbed by the increase of patients being treated at clinics. It may well be, of course, that gonorrhea and syphilis are both declining in prevalence and that this decline is not evident in the clinic figures, being offset by the attendance of an increasing number of patients not able to pay for medical care.

However, a study of our records indicates that a number of physicians who formerly reported large numbers of cases have reported few or no cases this year, which together with the smaller number of physicians reporting might well account for the decline. The increase in reported cases of syphilis is readily accounted for in the better reporting by institutions and by the somewhat increased attendance at clinics. Further analysis shows that the increase is entirely due to late syphilis as the number of cases of early syphilis have declined by 66; the number of cases of congenital syphilis have increased 36 and the number of cases of tertiary syphilis have increased 170 over last year.

Physicians reported 52.1 per cent of the gonorrhea, clinics 47.9 per cent and institutions 9.8 per cent. Physicians reported 23.7 per cent of the syphilis, clinics 76.3 per cent and institutions 19.6 per cent.

There were 162 deaths from syphilis at a death rate per 100,000 population of 3.8. If deaths from general paralysis of the insane and tabes dorsalis are included the total of deaths from syphilis was 356, at a rate of 8.3 per 100,000 population (Table XIII).

Of the 354 communities in the State, 99 reported no cases of either gonorrhea or syphilis as compared to 86 last year.

Because of the fact that with the exception of a small free clinic at the Massachusetts Memorial Hospitals no night clinic service was available in Boston or in the entire Boston Metropolitan Area, many persons needing treatment but employed at very low wages during the daytime could secure no medical care. Through the efforts of this Department and with the cooperation of the Massachusetts Society for Social Hygiene, the Boston Unemployment Relief Committee contributed \$4,000 toward the maintenance, for one year, of a free night clinic. Because its equipment and staff permitted it and because it was the most receptive to the plan, the Boston Dispensary was selected to operate this clinic, which was opened in May. The average monthly attendance at this clinic has been over 200, more than 50 per cent of which have been registered in the syphilis clinic. These patients have come from fourteen communities other than Boston in the Metropolitan Area. This clinic should meet a very definite need in the area. Subsidy of the Lynn



Clinic was suspended in October pending reorganization. The fourteen clinics aided by this Department admitted 2,653 new cases of gonorrhea and 2,241 new cases of syphilis during the year, a total of 4,894 as compared to 4,947 in 1931. The decrease is entirely in reported cases of gonorrhea, the number having declined from 2,742 (89 cases) in 1931. These patients made 217,153 visits, an increase of 33,515 over 1931, which indicates more improved attendance of those patients registered in the clinic. The total attendance at these fourteen clinics was 12,699 different individuals (Table XIV).

During the year the Department, together with the Massachusetts Society for Social Hygiene, has attempted to establish a follow-up service at the Fall River Clinic similar to that begun some three years ago in Lowell. For a combination of reasons the establishment of this service has not proceeded as satisfactorily as it did at Lowell, although there are hopes for its improvement in the future.

After some fifteen years of aiding clinics, the Department has attempted to formulate what it considers to be the minimum standards of good management of the gonorrhea and syphilis clinic, which might be used as criteria for the granting of subsidy. These standards have been submitted to and approved by a large number of individual physicians, nurses and social workers, as well as by a number of organizations, including the Public Health Committee of the Massachusetts Medical Society, the Neisserian Medical Society of Massachusetts, the New England Dermatological Society, the American Social Hygiene Association, the Massachusetts Society for Social Hygiene, the New England Section of the American Association of Hospital Social Workers and the Boston Health League. It is expected that when they are finally approved by the Public Health Council they should serve to improve the clinic management of these diseases. Certainly they have already somewhat clarified the situation by the very considerable discussion which they provoked.

One hundred thirty-five boards of health followed 2,936 cases reported by name for having prematurely discontinued treatment or as alleged sources of infection. Only 41.8 per cent of these cases could be found as compared to 48 per cent of approximately the same number last year. No final reports of the results of their investigation could be obtained from boards of health in 5.2 per cent of the cases. In Boston 36.7 per cent of 1,920 cases were located, as compared to 39.1 per cent last year.

Dr. Henry M. DeWolfe, Epidemiologist of the Subdivision, has been available for visiting physicians throughout the State during only six months of the year, since he has been acting district health officer during the balance of the time. A superficial examination of the results of his visits indicates that approximately half of the physicians in the State treat either gonorrhea or syphilis or both.

The total distribution of arsenicals decreased from 49,898 grams in 1931 to 44,890 in 1932. Much of this decrease may be attributed to the general tendency to use smaller doses. The distribution of neoarsphenamine amounted to 27,814 grams. Sulpharsphenamine is rapidly becoming unpopular, its distribution having declined some 5,300 grams over last year. Arsenicals were distributed to 289 physicians, as compared to 335 last year, which may indicate either a decline in the prevalence of syphilis or that patients are going to clinics, or both. As usual, less than 50 per cent (45.3 per cent) of the physicians using arsenicals during the year reported syphilis. This is worth particular comment since during the year a report form was included with every package of arsenicals distributed to physicians in the hopes that the percentage of those reporting might be increased. Actually it declined more than 2 per cent (Table XV and XVI).

The Wassermann Laboratory reported 100,951 blood and spinal fluid examinations for syphilis, and the Bacteriological Laboratory reported 9,105 smears examined for gonorrhea.

During the last four years the staff of the Subdivision has lectured to nearly 8,000 persons, including more than 5,200 doctors, nurses, social workers and medical students and 2,400 persons in non-professional groups. This does not include the many thousands of persons reached by our Public Health Education Worker, who, as full-time lecturer jointly for this Department and the Massachusetts Society for Social Hygiene, is constantly in the field.



During the year some 41,165 pieces of literature have been distributed by this Subdivision. It has been necessary to publish third editions of "Information for Men with Gonorrhea" and of "Information for the Patient with Syphilis." Thus a total of 200,000 of the former and 100,000 of the latter have been printed, together with 50,000 copies of "Important Information for Every Woman." There is great need for more literature of a general nature for public information concerning gonorrhea and syphilis.

Two ten-minute broadcasts were made over Station WEEI on the subject of gonorrhea and syphilis. It is remarkable that no complaint whatsoever has been received from the public over any of the four broadcasts which have been made during the past two or three years.

As usual, the Department has availed itself of the generosity of many physicians in the State who have given much of their time and thought in order that material published by the Department should conform with the best in medical practice. While it is not evidenced by improvement in reporting, there are nevertheless many things to indicate definitely increasing interest on the part of the medical profession in the management of gonorrhea and syphilis.

#### LOCAL HEALTH REGULATIONS

Owing to the confusion which exists from community to community due to differences in board of health regulations, a determined effort has been made in the western section of the State to bring about a certain degree of uniformity. To this end, twelve towns in Franklin County have been brought together and persuaded to adopt regulations which are for the most part uniform, especially with respect to communicable diseases. It is hoped that during the coming year further communities in the county may take a similar step and that comparable steps may be taken by certain communities in Berkshire and Hampshire Counties.

#### LOBAR PNEUMONIA STUDY

The completion of the second year of the lobar pneumonia study, made possible through the generosity of the Commonwealth Fund of New York City, has seen an increased interest in this disease. As was pointed out in last year's report, the aim of this study has been to devise means for making available concentrated anti-pneumococcic serum for those cases which may be benefited from it. Coincidental with this work has been an attempt to improve the quality of the serum and to determine certain facts which may have a bearing upon the control of lobar pneumonia, which is still one of our principal causes of death. The study has been continued during the past year under the four following heads:

(1) *Laboratory*.—This phase of the study, conducted under the supervision of the Division of Biologic Laboratories, has dealt with the preparation and improvement of Types I and II pneumococcus antibody solution. It has been found possible to produce a more potent serum than in previous years and, furthermore, to test the serum more effectively prior to its release. A more detailed report of this work will be found under the report of this Division.

(2) *Statistical*.—During 1931 the data on some 60,000 death certificates of persons dying from various forms of respiratory disease were coded and similar data from some 9,000 hospital records. The tabulation and analysis of this data is being actively pursued by the Division of Adult Hygiene. It will be some time, however, before the tabulations are complete and any conclusions can be drawn from them.

(3) *Epidemiological*.—Through the cooperation of the Harvard School of Public Health studies were completed as to the occurrence of pneumococci in the throats of those in contact with cases of lobar pneumonia, as compared with the normal population. These studies have shed considerable light upon the epidemiology of lobar pneumonia of Type I and II. Further work along this line has been begun during the latter part of the year and will continue during the coming pneumonia season.

(4) *Serum Therapy*.—The use of the pneumococcus serum has been further extended through the work of the physicians collaborating with the Pneumonia Advisory Committee. In certain areas these physicians have seen and treated a very high proportion of the cases of lobar pneumonia with results that are distinctly encouraging, the fatality rate of the treated cases in Type I pneumonia being

about half of that of the untreated cases. The development of the areas in which the serum is available has been of necessity limited. Five new areas have, however, been added during the past year, with laboratory facilities available and trained collaborators who are prepared to use the serum under conditions of close observation. The areas now established center around Ayer, Beverly, Boston, Brockton, Fall River, Great Barrington, Malden, New Bedford, Newton, Pittsfield, Salem, Springfield and Worcester and the Chelsea Naval Hospital.

### MILK

The outstanding development during the past year in the program for milk sanitation has been the establishment of the Milk Regulation Board, which provides for a State dairy inspection. This does not preclude the possibility of additional inspections made by the local boards. It does, however, provide a means for minimal inspection of all dairies, thus tending toward a uniformity of practice throughout the State and likewise furnishing inspectional service to many communities which because of their size have been unable to afford this type of milk protection. It is hoped that it may to a large part do away with much of the conflict that has previously existed because of marked differences in inspectional standards of neighboring communities as well as differences in interpretation of identical regulations. To the extent to which this Board provides for a fairly uniform and supervised system of production it will be a step forward. On the other hand, it does not in any sense of the word relieve the local board of health of the responsibility for supervising the quality of milk which is offered for sale within the community. It makes possible, therefore, a more intensive local supervision, which is, in the last analysis, of considerably greater importance than regulation of the conditions under which the milk is produced and is certainly more economical.

There has been during the past year an increased interest on the part of the milk producers in the tuberculin testing of cattle, in which this Department has been greatly interested because of the possibility of milk-borne tuberculosis. The program for testing under the supervision of the Division of Animal Industry of the Department of Conservation has progressed so far that it probably needs little further assistance from this Department, except in the southeastern section of the State. The demands for testing are already far in excess of the ability of the State to comply with them. It is, however, possible in the not too distant future to see the time when through a completion of the testing and a continuance of the periodic retesting the possibility of the spread of tuberculosis through the milk supply will have been eliminated.

Coincidental with the interest on the part of the milk producers there has been an increased interest on the part of the boards of health in regulations which would exclude from local sale any raw milk which is not from tuberculin tested cattle. The number of boards requiring such regulations has increased during the past year from 120 to 142, thus affording this type of protection to about 85 per cent of the population of the State. In many communities, however, the testing has progressed far ahead of the local board of health regulations so that the percentage of the population protected by such regulations or through testing, irrespective of regulations, is considerably above the figure of 85 per cent.

A few communities have been even more active in safeguarding the milk supply in that they require that all milk be either pasteurized or certified. The percentage of the total supply that is certified is so exceedingly small that it can never be considered as of major public health significance. For practical purposes, therefore, it can be assumed that in these communities all of the milk supply is pasteurized. Already about a dozen cities and towns have taken this step. Particularly significant among this group is the town of Ayer, where such a regulation has been in effect for over two years, demonstrating that such a protection can be obtained without hardship to the producer in the smaller communities as well as the large cities.

The past year has been remarkably free from instances of milk-borne disease. Eleven cases of typhoid reported in January were all part of the milk-borne outbreak in Lee and Stockbridge which occurred late in December, 1931. No other cases of typhoid were traced to milk during the year.



A small but serious outbreak of septic sore throat occurred in Topsfield. Twenty out of twenty-five consumers of the milk from a single cow developed the disease and three died. This illustrates in striking fashion the danger that still lurks around the small unsupervised milk supply.

In Ipswich a number of gastro-intestinal disturbances occurred among three related families which had apparently nothing in common other than a single private milk supply. Inasmuch as the milker was the first case and continued at work while sick, it is reasonable to believe that he was the source of infection for the other members of the group, who sickened some three or four days later.

Eight cases of scarlet fever in Brockton were in all probability due to consumption of infected milk. It is impossible to determine in this instance whether or not this milk which was presumably pasteurized may have been circuited around the pasteurization plant and infected by the milker who was known to have had scarlet fever or may have been infected after pasteurization by the bottling machine operator, who was likewise found to be sick with scarlet fever. The occurrence of only eight cases on a supply of over two hundred quarts would point toward the latter supposition.

#### DISTRICT HEALTH UNITS

The two district health units which were made possible through the generosity of the Commonwealth Fund have continued during the past year and made reasonable progress in their demonstration of cooperative health work. In the union of sixteen towns in the southern half of Berkshire County, outstanding progress has been made through an amalgamation of the nursing service of the Unit with that of the Great Barrington Visiting Nurse Association. Through this arrangement, whereby neither organization loses its identity, there will inevitably be achieved a more complete and unified nursing program than would ever be possible through a separation of the services. This will also tend toward lower expenditures per unit of service rendered, which is, of course, of vital importance for the success of any such program. Coincidental with this amalgamation of the nursing services there has been a transfer of the Unit office so that the Unit and the Great Barrington Visiting Nurse Association now share the same offices, thus further unifying the entire public health program. On November 1st, Dr. Frederick S. Leeder, to whom is due considerable credit for the completion of these arrangements, completed his services with the Unit and was replaced by Dr. Harold W. Stevens, formerly Epidemiologist in this Division. Plans are now being completed for a greater extension of the service offered in tuberculosis and other communicable diseases. A dental program was likewise instituted during the year, the Unit providing for the services of the dental hygienist and the several towns through their voluntary agencies providing reparative service.

Progress in the Nashoba Unit has of necessity been somewhat more slow because of the fact that there was no pre-existing organization with which the Unit's work might be integrated. The establishment of diphtheria immunization clinics and of child welfare conferences have been among the outstanding accomplishments of the past year. Likewise of particular note has been the establishment of a tuberculosis follow-up clinic in cooperation with the Out-Patient Department of the Middlesex County Sanatorium, this being the first clinic of that nature to be formed out of this hospital. Plans are being completed for a more intensive communicable disease control program, tuberculosis case finding and dental hygiene work during the coming year, as well as a firm establishment of the child welfare conferences.

The County Health Unit of Barnstable County has continued along the same lines during the past year with the cooperation of the U. S. Public Health Service, but vitally weakened through the death of Mr. G. Webster Hallett, who had for the past ten years been an outstanding figure in public health on the Cape. More active diphtheria immunization programs than in any previous year have been outstanding in the work of this Unit. It is hoped that this work can be carried on even more actively in this section of the State, where little if any progress has been heretofore made in diphtheria control during the past twenty years.



## BACTERIOLOGICAL LABORATORY

During the past year 32,781 specimens were examined in the Bacteriological Laboratory, an increase of 176 over the previous year. As will be noted from the table, there was an appreciable decrease in the number of diphtheria specimens, a decrease proportionately smaller, however, than the decrease in the incidence of diphtheria. This is an encouraging sign, indicating that the physicians of the State have utilized the laboratory somewhat more extensively than the previous years. This increased utilization of the laboratory is also reflected in the greater number of sputa sent in for tuberculosis examination, in spite of the continued decline in prevalence. Noteworthy also is the marked increase in the number of pneumonia sputa submitted for typing. This increased work is a reflection of the special pneumonia study and has been made possible through funds granted for the study.

There is a growing tendency among the physicians sending specimens to ask for more detailed information about the organisms present in the specimens. These studies are often time consuming. During the latter part of the year a change in the procedure for gonorrhea smears was made which should facilitate this very time-consuming feature of the work without sacrifice of efficiency and accuracy.

During the year there has been opportunity to study bacilli from cases of dysentery occurring in institutions. Most of the bacilli that have been isolated seem to belong to the para-dysentery group, Hiss-Y variety. Another para-dysentery bacillus, which could not be classified, was likewise found. Much interesting work could be done with these anomalous organisms but pressure of routine work has prevented it.

At these times when the question of government economies is coming more and more to public attention, it would be well to consider the savings that many of the smaller communities might make through abandoning their local laboratory services with absorption of the work in the State laboratory. Many of these communities maintain laboratories in which the total number of specimens examined in the course of a year is less than five hundred. The per specimen cost is of necessity high, and because of the small number of specimens those responsible for the work cannot be as familiar with the technical details as are those who examine many thousand specimens in the course of a year. In many instances marked economies could be realized were these local laboratories to be given up and messenger service provided to bring emergency specimens to the State laboratory. Of the total number of specimens submitted only a relatively small proportion are of an emergency nature, so that the cost of messenger service would be relatively small as compared with the present cost of laboratory maintenance. This is a matter which should receive increasing attention during the coming year.

## MALARIA PREVENTION

During the past year the periodic surveys of mosquito breeding in connection with the extension of the Metropolitan water supply have been continued. Because of the conditions under which this work must be continued, there are always possibilities of mosquito breeding. Furthermore, the possible importation of labor in areas in which malaria is most prevalent introduces the possibility that this disease might become seeded within the State. The surveys of the past year have shown that mosquito breeding is at a minimum and that there is at present no evidence of the introduction of malaria into the State through this construction work.

## PUBLIC HEALTH EDUCATION

During the past year speakers from the Division gave forty-nine talks, exclusive of those referred to elsewhere under Gonorrhea and Syphilis. These talks reached about 2,500 people. In addition nine radio broadcasts were prepared and delivered. Two popular pamphlets on communicable diseases were printed, one dealing with whooping cough and the other with smallpox vaccination.

TABLE I. — *Anterior Poliomyelitis*

YEAR	Cases	Case Rate per 100,000	Deaths	Death Rate per 100,000	Fatality Rate (Per Cent)
1928 . . . . .	434	10.3	65	1.5	15.0
1929 . . . . .	119	2.8	21	.5	17.6
1930 . . . . .	503	11.8	35	.8	7.0
1931 . . . . .	1,428	33.4	114	2.7	8.0
1932 . . . . .	61	1.4	13	.3	21.3

TABLE II. — *Diphtheria*

1928 . . . . .	4,052	96.2	249	5.9	6.1
1929 . . . . .	4,255	100.5	256	6.0	6.0
1930 . . . . .	3,322	78.1	182	4.3	5.5
1931 . . . . .	2,381	55.7	130	3.0	5.4
1932 . . . . .	1,811	42.1	107	2.5	5.9

TABLE III. — *Epidemic Cerebrospinal Meningitis*

1928 . . . . .	107	2.5	38	.9	35.5
1929 . . . . .	167	3.9	79	1.9	47.3
1930 . . . . .	174	4.1	59	1.4	33.9
1931 . . . . .	101	2.4	30	.7	29.7
1932 . . . . .	83	1.9	34	.8	41.0

TABLE IV. — *Lobar Pneumonia*

1928 . . . . .	4,785	113.6	2,163	51.3	45.2
1929 . . . . .	5,287	124.9	2,202	52.0	41.6
1930 . . . . .	4,333	101.8	1,883	44.3	43.5
1931 . . . . .	3,873	90.6	1,718	40.2	44.4
1932 . . . . .	4,028	93.7	1,688	39.3	41.9

TABLE V. — *Measles*

1928 . . . . .	41,519	985.5	265	6.3	.6
1929 . . . . .	14,925	352.5	121	2.9	.8
1930 . . . . .	27,137	637.8	137	3.2	.5
1931 . . . . .	16,581	387.8	64	1.5	.4
1932 . . . . .	19,763	459.9	64	1.5	.3

TABLE VI. — *Scarlet Fever*

1928 . . . . .	10,473	248.6	90	2.1	.9
1929 . . . . .	9,975	235.6	71	1.7	.7
1930 . . . . .	9,408	221.1	98	2.3	1.0
1931 . . . . .	12,782	298.9	101	2.4	.8
1932 . . . . .	16,580	385.8	145	3.4	.9

TABLE VII. — *Smallpox*

1928 . . . . .	19	—
1929 . . . . .	273	1
1930 . . . . .	2	—
1931 . . . . .	6	—
1932 . . . . .	43	—

TABLE VIII. — *Tuberculosis, Pulmonary*

1928 . . . . .	4,873	115.7	2,690	63.9
1929 . . . . .	4,538	107.2	2,561	60.5
1930 . . . . .	4,696	110.4	2,423	56.9
1931 . . . . .	4,421	103.4	2,306	53.9
1932 . . . . .	3,994	92.9	2,041	47.5

TABLE IX. — *Tuberculosis, Non-Pulmonary*

YEAR	Cases	Case Rate per 100,000	Deaths	Death Rate per 100,000	Fatality Rate (Per Cent)
1928 . . . . .	757	18.0	433	10.3	
1929 . . . . .	649	15.3	361	8.5	
1930 . . . . .	587	13.8	311	7.3	
1931 . . . . .	555	13.0	248	5.8	
1932 . . . . .	466	10.8	260	6.1	

TABLE X. — *Typhoid Fever*

1928 . . . . .	310	7.4	36	.85	11.6
1929 . . . . .	307	7.3	42	.99	13.7
1930 . . . . .	318	7.5	38	.89	11.9
1931 . . . . .	250	5.8	30	.70	12.0
1932 . . . . .	214	5.0	25	.58	11.7

TABLE XI. — *Whooping Cough*

1928 . . . . .	8,023	190.4	208	4.9	2.6
1929 . . . . .	7,708	182.1	137	3.2	1.8
1930 . . . . .	10,750	252.6	182	4.3	1.7
1931 . . . . .	7,174	167.8	88	2.1	1.2
1932 . . . . .	7,881	183.4	107	2.5	1.4

TABLE XII. — *Gonorrhea and Syphilis*

YEAR	GONORRHEA		SYPHILIS			
	Cases	Case Rate per 100,000	Cases	Case Rate per 100,000	Deaths	Death Rate per 100,000
1928 . . . . .	4,506	107.0	1,569	37.2	164	3.9
1929 . . . . .	4,410	104.2	1,531	36.2	133	3.1
*1930 . . . . .	6,974	163.9	4,197	98.6	149	3.5
1931 . . . . .	7,201	168.4	4,447	104.0	168	3.9
1932 . . . . .	6,738	157.0	4,530	105.4	162	3.8

\*All forms made reportable to State Department of Public Health.

TABLE XIII. — *General Paralysis of the Insane*

YEAR	DEATHS		FIRST ADMISSIONS TO STATE INSTITUTIONS FOR MENTAL DISEASES		
	Deaths	Death Rate per 100,000	First Admissions	Rate per 100,000	Per Cent of All First Admissions
1928 . . . . .	204	4.7	202	4.7	6.4
1929 . . . . .	186	4.2	226	5.2	7.4
1930 . . . . .	168	3.9	227	5.3	7.2
1931 . . . . .	166	3.9	203	4.8	6.4
1932 . . . . .	166	3.9	206	4.8	6.6

TABLE XIV. — *Gonorrhea and Syphilis Treated in Clinics and Institutions.*  
*Clinics*

YEAR	NEW CASES		Visits	Number of Clinics
	Gonorrhea	Syphilis		
1928 . . . . .	2,463	2,652	192,861	24
1929 . . . . .	2,452	2,609	194,262	25
1930 . . . . .	2,747	2,968	217,452	25
1931 . . . . .	3,040	2,631	206,433	25
1932 . . . . .	2,978	2,876	249,263	26



*Institutions*

YEAR	NEW CASES		Visits	Number of Clinics
	Gonorrhea	Syphilis		
1928 . . . . .	338	635	-	27
1929 . . . . .	344	660	-	27
1930 . . . . .	356	723	-	25
1931 . . . . .	436	823	-	24
1932 . . . . .	522	987	-	24

TABLE XV. — *Grams of Arsphenamine, Sulpharsphenamine and Neoarsphenamine Distributed.*

YEAR	Arsphen-amine	Sulph-arsphenamine	Neo-arsphenamine	Total
1928 . . . . .	8,312	16,619	13,134	38,066
1929 . . . . .	8,753	17,634	18,146	44,533
1930 . . . . .	9,802	12,915	22,284	45,001
1931 . . . . .	9,235	13,676	26,987	49,898
1932 . . . . .	8,681	8,394	27,815	44,890

TABLE XVI.—*Grams of Arsenicals Distributed to Clinics, Institutions and Physicians*

YEAR	Clinics and Institutions	Physicians
1928 . . . . .	35,447	2,619
1929 . . . . .	36,893	7,640
1930 . . . . .	36,103	8,898
1931 . . . . .	40,714	9,183
1932 . . . . .	36,903	6,987

TABLE XVII.—*Laboratory Examinations—1932*

	Positive	Negative	Total for 1932	Total for 1931
Diphtheria:				
Diagnosis . . . . .	493	6,550	7,043	9,148
Release . . . . .	1,170	2,134	3,304	3,299
Tuberculosis:				
Sputum . . . . .	910	4,090	5,000	4,408
Animal inoculations . . . . .	21	163	184	140
Typhoid Fever:				
Widal test . . . . .	129	1,663	*1,845	*1,790
Examination for typhoid bacilli:				
Blood . . . . .	5	62	67	76
Feces . . . . .	96	1,381	1,477	1,499
Urine . . . . .	8	629	637	760
Feces and urine, combined . . . . .	11	170	181	-
Miscellaneous (bile, etc.) . . . . .	0	12	12	11
Gonorrhea . . . . .	1,779	7,326	9,105	8,510
Malaria . . . . .	1	41	42	50
Miscellaneous:				
Pneumococcus type determinations . . . . .	-	-	1,132	568
Hemolytic streptococci . . . . .	-	-	1,435	1,362
Spinal fluid for meningococci . . . . .	-	-	16	16
Undulant fever . . . . .	21	318	339	401
Unclassified . . . . .	-	-	962	567
Total . . . . .			32,781	32,605

\*Includes 53 a typical

TABLE XVIII. — *Laboratory Examinations for Rabies\*\**

YEARS	Positive		Negative	Total Animals Examined
	Dogs	Other Animals		
1928 . . . . .	334	26	186	546
1929 . . . . .	316	5	134	455
1930 . . . . .	292	18	161	471
1931 . . . . .	290	14	211	515
1932 . . . . .	125	6	130	265

\*\*Wassermann Laboratory

*Cases and Deaths, with Case and Death Rates per 100,000 Population\* for Reportable Diseases During the Year 1932*

DISEASES	Cases	Case Rate per 100,000 Population	Deaths	Death Rate per 100,000 Population	Fatality Rate (Per Cent)
Actinomycosis . . . . .	2	.04	1	.02	50.0
Anterior Poliomyelitis . . . . .	61	1.4	13	.3	21.3
Anthrax . . . . .	1	.02	1	.02	100.0
Chicken Pox . . . . .	9,913	230.7	7	.2	.07
Diphtheria . . . . .	1,811	42.1	107	2.5	5.9
Dog Bite . . . . .	5,646	131.4	—	—	—
Dysentery . . . . .	65	1.5	5	.1	7.7
Encephalitis Lethargica . . . . .	22	.5	19	.4	86.4
Ep. Cerebrospinal Meningitis . . . . .	83	1.9	34	.8	41.0
German Measles . . . . .	622	14.5	—	—	—
Gonorrhea . . . . .	6,738	156.8	4	.1	—
Influenza . . . . .	436	10.1	360	8.4	—
Lobar Pneumonia . . . . .	4,028	93.7	1,688	39.3	41.9
Malaria . . . . .	14	.3	4	.1	28.6
Measles . . . . .	19,763	459.9	64	1.5	.3
Mumps . . . . .	9,366	218.0	5	.1	.05
Ophthalmia Neonatorum . . . . .	1,138	26.5	1	.02	—
Paratyphoid Fever . . . . .	11	.3	—	—	—
Pellagra . . . . .	17	.4	8	.2	47.1
Rabies . . . . .	—	—	—	—	—
Scarlet Fever . . . . .	16,580	385.8	145	3.4	.9
Septic Sore Throat . . . . .	232	5.4	37	.9	15.9
Smallpox . . . . .	43	1.0	—	—	—
Syphilis . . . . .	4,530	105.4	162	3.8	—
Tetanus . . . . .	19	.4	19	.4	—
Trachoma . . . . .	39	.9	—	—	—
Trichinosis . . . . .	15	.3	—	—	—
Tuberculosis, Pulmonary . . . . .	3,994	92.9	2,041	47.5	—
Tuberculosis, Other Forms . . . . .	466	10.8	260	6.1	—
Tuberculosis, Hilum . . . . .	612	14.2	—	—	—
Typhoid Fever . . . . .	214	5.0	25	.6	11.7
Typhus Fever . . . . .	2	.04	—	—	—
Undulant Fever . . . . .	15	.3	—	—	—
Whooping Cough . . . . .	7,881	183.4	107	2.5	1.4
Total . . . . .	94,379	2,196.4	5,117	119.1	—

\*Population — 4,297,050

Cases and Deaths for all Reportable Diseases by Months—1932

	JAN.		FEB.		MARCH		APRIL		MAY		JUNE		JULY		AUGUST		SEP-TEMBER		OCTOBER		NO- VEMBER		DE- CEMBER		TOTAL	
	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths
Actinomycosis . . . . .	6	3	4	1	3	2	5	1	2	1	3	1	5	1	10	1	12	2	4	2	4	1	3	1	2	1
Anterior Poliomyelitis . . . . .																										
Anthrax . . . . .	1265	2	914	1	1018	1	997	1	938	1	977	1	429	1	123	1	81	1	344	1	1127	3	1700	1	61	13
Chicken Pox . . . . .	253	8	223	18	169	5	130	7	135	5	149	10	125	8	120	4	70	6	111	11	160	11	156	14	9913	17
Diphtheria . . . . .	287		291		411		514		660		711		655		592		505		387		315		318		5646	107
Dog Bite . . . . .	3		1		1		1		1		1		6		3		4		26		24		3		5	5
Dysentery . . . . .	2	3	1	2	2	1	1	2	2	2	1	1	2	2	3	3	2	1	1	1	1	1	1	1	22	19
Encephalitis Lethargica . . . . .																										
Epidemic Cerebrospinal Meningitis . . . . .	4	1	6	4	9	4	12	2	7	4	11	3	2	2	2	2	7	3	7	4	10	3	6	4	83	34
German Measles . . . . .	59		62		77		100		100		61		23		26		34		27		25		28		622	4
Gonorrhea . . . . .	680		525		490		474		473		548		605		653		587		579		511		613		6738	4
Hookworm . . . . .	104	56	63	61	91	65	38	52	14	14	9	10	4	10	5	4	6	7	10	20	14	18	78	43	436	360
Influenza . . . . .																										
Leprosy . . . . .	530	215	489	219	807	305	626	261	374	147	208	72	101	46	75	37	67	27	186	81	191	100	374	178	4028	1688
Lobar Pneumonia . . . . .																										
Malaria . . . . .	1602	3	1565	6	2415	5	3108	15	4464	15	3875	7	1391	7	253	3	94	1	198	1	279	2	519	2	19763	14
Measles . . . . .	1313	1	1168		1401	2	1385	1386	1374	15	988	1	341	7	176	3	111	1	216	1	353	1	528	1	9366	64
Mumps . . . . .	127		112		65		96		174		77		35		160		46		88		78		80		1138	5
Ophthalmia Neonatorum . . . . .																										
Paratyphoid . . . . .																										
Pellagra . . . . .																										
Rabies . . . . .	2021	26	2065	21	2327	22	2235	19	1961	15	1399	7	599	5	315	5	363	7	730	3	1038	7	1527	8	16580	145
Scarlet Fever . . . . .	27	1	14	7	31	6	39	4	19	1	19	5	20	4	7	1	9	1	10	4	15	1	22	3	232	37
Septic Sore Throat . . . . .	38		15																						43	
Smallpox . . . . .	613	11	308	12	400	22	369	15	365	8	379	9	349	12	333	13	369	16	366	15	310	9	369	20	4530	162
Syphilis . . . . .	5	2	1	2	1	1	2	1	3	3	1	1	5	4	1	2	2	1	1	1	1	1	1	1	19	19
Tetanus . . . . .	5		1		5		7		2		1		5		3		2		2		3		1		39	35
Trachoma . . . . .																										
Trichinosis . . . . .	322	204	276	175	423	223	406	213	338	176	322	152	422	159	283	152	291	145	307	141	299	151	305	150	3994	2041
Tuberculosis, Pulmonary . . . . .	30	28	31	24	39	25	61	31	55	29	36	30	54	21	31	34	34	12	38	25	32	13	25	15	466	260
Tuberculosis, Other Forms . . . . .	66		75		49		32		33		104		90		21		14		40		29		59		612	25
Tuberculosis, Hilum . . . . .	18		13		9		7		13		17		20		28		30		31		11		17		214	2
Typhoid Fever . . . . .																										
Typhus Fever . . . . .																										
Undulant Fever . . . . .	904	15	854	9	1061	10	898	1	815	12	679	6	579	6	452	8	303	4	271	5	396	7	669	5	7881	107
Whooping Cough . . . . .																										
Total . . . . .	10280	579	9069	545	11308	700	11552	643	12339	437	10589	317	5887	288	3688	245	3046	244	3088	319	5228	327	7405	453	94379	5117



Cases of Reportable Diseases for 1932 by Ages

DISEASE	Under 1 Year	1 Year	2 years	3 years	4 years	5 years	6 years	7 years	8 years	9 years	10 years	15 to 19 years	20 to 24 years	25 to 29 years	30 to 34 years	35 to 44 years	45 to 54 years	55 to 64 years	65 to 74 years	75 years and over	Age Unknown	Total	Male	Female	Unknown
Anterior Poliomyelitis	5	2	3	3	2	5	1	8	3	2	13	8	2	2	2	1	1	5	2	1	2	61	31	30	Unknown
Chicken Pox	268	381	476	589	717	1263	1907	1341	808	453	811	145	71	36	35	29	23	14	2	5	514	9913	5035	4854	24
Diphtheria	22	46	118	148	141	129	128	103	114	77	249	96	73	55	52	56	23	23	14	5	161	1811	834	977	-
Dysentery:																									
Amebic	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4	3	1	-
Bacillary	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	54	21	33	-
Not stated	-	-	2	1	1	1	1	1	2	-	-	-	-	-	-	-	-	-	-	-	3	4	3	8	-
Epidemic Cerebrospinal Meningitis	10	6	7	3	2	3	3	1	1	2	4	6	6	3	9	4	5	2	2	2	3	83	56	27	-
German Measles	48	62	34	41	28	48	53	52	49	36	79	15	16	8	3	3	4	1	1	4	45	822	318	302	2
Gonorrhea	34	4	14	11	11	14	25	14	17	17	38	714	2073	1554	876	894	242	82	25	4	75	6738	5053	1685	-
Hookworm	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Influenza	5	12	5	7	8	7	3	1	5	2	28	26	30	27	37	58	41	40	38	19	37	436	191	221	24
Lobar Pneumonia	114	119	134	102	96	99	115	90	82	56	215	245	175	193	188	464	465	406	303	211	156	4028	2265	1759	4
Malaria	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4	14	14	-	101
Measles	453	985	1180	1355	1634	2310	3341	2873	1843	1020	1445	222	128	65	32	51	17	8	3	3	798	19763	10007	9655	33
Mumps	32	104	172	252	420	807	1357	1278	1061	699	1638	356	179	132	129	153	44	17	10	5	521	9366	4950	4383	-
Paratyphoid Fever	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	11	11	4	-
Pellagra	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	17	11	6	-
Scarlet Fever	72	303	714	990	1229	1398	1678	1597	1349	1084	3144	799	467	346	270	306	79	23	6	-	798	16580	8156	8385	39
Septic Sore Throat	2	6	12	8	15	3	8	7	7	3	14	28	18	24	13	21	14	8	3	5	12	232	98	134	-
Smallpox	4	4	1	2	-	1	1	-	-	-	1	259	590	575	582	957	778	403	120	-	22	4530	2597	1933	-
Syphilis	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	11	43	29	14	-
Trachoma	57	7	8	4	9	8	11	7	11	12	87	259	590	575	582	957	778	403	120	23	22	4530	2597	1933	-
Tuberculosis, Pulmonary	10	16	16	5	10	15	23	19	24	17	149	338	516	462	387	650	484	303	122	41	387	3994	2154	1840	-
Tuberculosis, Other Forms	22	20	19	18	9	13	7	11	5	15	42	23	46	30	28	46	35	19	5	2	51	466	211	255	-
Typhoid Fever	-	6	2	3	3	2	4	7	5	3	29	31	30	19	17	27	17	7	3	3	2	215	112	103	-
Typhus Fever	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	2	2	-
Undulant Fever	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	15	8	7	-
Whooping Cough	571	647	789	842	863	902	1105	661	420	208	263	38	8	8	10	17	3	5	2	2	517	7881	3801	3975	105

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## Cases and Deaths from Diseases Dangerous

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			Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths
1	Massachusetts	4,297,050	61	13	9913	7	1811	107	5646	-	83	34	622	-
2	CITIES OF OVER 500,000													
	Boston	781,890	7	4	2374	-	540	33	1984	-	20	18	172	-
3	CITIES OF OVER 150,000	550,760	4	2	1333	-	119	16	635	-	3	3	40	-
4	Worcester	197,350	3	1	556	-	102	12	354	-	-	1	32	-
5	Springfield	153,410	1	1	782	-	17	4	281	-	3	2	8	-
6	CITIES OF 100,000-150,000	537,613	6	2	984	1	309	15	668	-	9	1	67	-
7	Cambridge	110,933	2	-	276	-	69	3	274	-	4	-	32	-
8	New Bedford	109,492	1	-	128	-	78	3	78	-	1	-	6	-
9	Fall River	109,118	2	1	191	1	41	3	111	-	1	1	2	-
10	Somerville	106,090	1	1	87	-	64	3	89	-	3	-	9	-
11	Lynn	101,980	-	-	302	-	57	3	116	-	-	-	18	-
12	CITIES OF 50,000-100,000	671,217	10	-	1040	1	196	17	579	-	13	5	80	-
13	Lowell	95,721	-	-	45	-	38	11	118	-	1	-	2	-
14	Lawrence	81,288	2	-	63	-	3	-	65	-	2	2	1	-
15	Quincy	77,340	2	-	133	-	26	-	58	-	2	-	6	-
16	Newton	70,770	2	-	156	-	6	1	60	-	4	2	21	-
17	Medford	65,140	-	-	261	1	39	1	86	-	1	-	11	-
18	Brockton	63,104	-	-	129	-	11	-	50	-	-	-	17	-
19	Malden	60,840	4	-	129	-	22	4	58	-	1	1	10	-
20	Holyoke	54,829	-	-	42	-	2	-	46	-	-	-	8	-
21	Everett	51,255	-	-	60	-	47	-	29	-	2	-	4	-
22	Pittsfield	50,930	-	-	22	-	2	-	9	-	-	-	-	-
23	CITIES AND TOWNS OF 25,000-50,000	492,087	3	1	1132	2	208	10	527	-	9	-	63	-
24	Brookline	49,650	1	-	81	-	7	-	29	-	2	-	8	-
25	Haverhill	48,475	-	-	91	-	13	2	75	-	-	-	6	-
26	Chelsea	45,175	-	1	60	-	44	1	56	-	2	-	2	-
27	Chicopee	44,850	1	-	27	-	8	-	46	-	1	-	1	-
28	Salem	43,590	-	-	42	-	52	2	7	-	1	-	-	-
29	Waltham	41,270	-	-	168	1	15	3	54	-	-	-	3	-
30	Arlington	41,108	-	-	390	-	19	1	53	-	1	-	25	-
31	Fitchburg	39,380	1	-	58	-	11	-	20	-	-	-	1	-
32	Watertown	39,156	-	-	120	-	13	-	79	-	-	-	16	-
33	Revere	36,766	-	-	64	-	9	-	50	-	1	-	-	-
34	Taunton	36,502	-	-	12	-	14	1	10	-	-	-	-	-
35	Beverly	26,165	-	-	19	1	3	-	48	-	1	-	1	-
36	CITIES AND TOWNS OF 10,000-25,000	731,300	16	3	1645	2	214	7	794	-	20	5	119	-
37	Belmont	24,664	-	-	183	-	6	-	46	-	-	-	11	-
38	Gloucester	24,575	1	-	13	-	1	-	22	-	1	-	4	-
39	Melrose	24,520	-	-	31	-	14	1	24	-	-	-	1	-
40	Northampton	24,485	-	1	110	-	2	-	43	-	1	1	12	-
41	Framingham	22,715	-	-	143	-	2	-	65	-	1	-	-	-
42	Weymouth	22,511	1	-	12	-	7	-	21	-	2	-	-	-
43	Attleboro	22,282	-	-	13	-	10	-	44	-	-	-	2	-
44	Peabody	22,005	-	-	49	-	19	-	27	-	2	-	-	-
45	Leominster	21,672	2	-	88	-	13	3	-	-	4	2	1	-
46	Methuen	21,276	-	-	53	-	2	-	12	-	-	-	-	-
47	North Adams	21,131	1	1	-	-	-	-	3	-	-	-	-	-
48	Westfield	19,968	-	-	41	-	-	-	23	-	2	1	-	-
49	Woburn	19,910	-	-	13	-	7	-	8	-	-	-	-	-
50	Gardner	19,698	-	-	15	1	-	-	10	-	-	-	4	-
51	Milton	18,040	-	-	61	-	3	-	11	-	-	-	12	-
52	West Springfield	17,293	-	-	3	-	1	-	1	-	-	-	-	-
53	Winthrop	17,162	-	-	115	-	3	-	46	-	-	-	4	-
54	Braintree	16,841	1	-	120	-	2	-	43	-	-	-	4	-
55	Wakefield	16,633	-	-	14	-	2	-	-	-	2	-	-	-
56	Dedham	15,682	1	-	17	-	-	-	15	-	-	-	2	-
57	Greenfield	15,612	2	1	80	-	2	1	12	-	-	-	8	-
58	Saugus	15,579	-	-	11	-	1	-	-	-	-	-	3	-
59	Norwood	15,450	-	-	6	-	2	-	5	-	-	-	1	-
60	Marlboro	15,297	-	-	29	-	13	-	10	-	-	-	3	-
61	Newburyport	14,840	-	-	4	-	14	-	18	-	-	-	1	-
62	Milford	14,725	-	-	2	-	3	-	22	-	1	-	1	-
63	Natick	13,907	1	-	35	-	-	-	-	-	-	-	-	-
64	Southbridge	13,715	1	-	6	-	5	-	3	-	-	-	-	-
65	Danvers	13,476	1	-	18	-	5	-	8	-	-	-	-	-
66	Winchester	13,236	-	-	27	-	5	-	48	-	1	1	9	-
67	Plymouth	12,984	-	-	33	-	3	-	3	-	-	-	4	-
68	Webster	12,814	-	-	16	1	2	-	-	-	-	-	-	-
69	Wellesley	12,512	1	-	54	-	10	-	40	-	-	-	9	-
70	Adams	12,326	2	-	12	-	6	-	2	-	-	-	1	-
71	Clinton	12,205	-	-	8	-	1	-	23	-	1	-	-	-
72	Amesbury	12,198	-	-	38	-	1	-	8	-	-	-	1	-
73	Needham	11,680	-	-	29	-	3	-	48	-	-	-	11	-

to the Public Health, 1932

Gonorrhea	Influenza	Lobar Pneumonia	Measles	Mumps	Scarlet Fever	Syphilis	Tuberculosis, Pulmonary	Tuberculosis, Other Forms	Typhoid Fever	Whooping Cough	Line No.											
Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths											
6738	4	436	360	4028	1688	19763	64	9366	5	16580	145	4530	162	3994	2041	466	260	214	25	7881	107	1
2485	1	70	40	1028	463	2741	9	2033	-	4372	41	1889	51	1114	452	97	64	26	4	1871	30	2
598	-	11	17	370	141	2308	5	1246	1	1450	17	391	14	292	124	25	30	20	6	757	7	
240	-	8	8	238	94	315	1	800	-	1169	11	170	10	188	78	16	21	17	3	538	5	3
358	-	3	9	132	47	1993	4	446	1	281	6	221	4	104	46	9	9	3	3	219	2	4
760	-	75	39	619	173	3202	16	899	-	2364	30	614	28	695	231	66	31	30	2	1019	17	
217	-	31	7	200	52	405	3	525	-	500	2	176	4	143	67	13	8	4	2	449	4	5
163	-	3	8	77	29	170	2	57	-	385	3	126	9	137	67	17	9	5	-	70	2	6
97	-	21	12	82	27	1038	8	66	-	291	10	98	3	104	57	9	8	16	-	107	3	7
149	-	15	8	182	36	256	2	105	-	384	1	108	2	103	15	18	2	3	-	91	2	8
134	-	5	4	78	29	1333	1	146	-	804	4	106	5	108	15	9	4	2	-	302	6	9
998	1	41	61	676	241	3536	6	639	2	2462	22	533	15	567	184	83	38	39	6	986	19	
286	-	3	2	49	32	66	1	5	1	658	6	120	-	76	38	16	10	17	2	48	6	10
123	-	9	12	36	32	16	-	17	-	133	2	75	1	70	18	11	4	4	2	56	3	11
94	-	4	7	40	33	105	-	182	1	218	2	61	2	55	24	14	2	4	-	71	2	12
67	-	6	8	51	20	1275	1	81	-	400	1	27	-	33	12	5	3	-	-	178	-	13
88	-	8	8	77	18	514	-	105	-	182	-	41	-	52	6	7	2	4	-	191	-	14
39	-	2	6	58	27	861	3	38	-	307	2	51	2	79	15	6	5	-	-	147	-	15
95	-	1	3	78	22	215	-	125	-	229	5	43	-	72	22	7	5	2	-	115	-	16
49	-	3	2	38	17	450	-	37	-	79	3	48	5	40	25	6	1	7	-	92	6	17
94	-	2	7	116	22	22	-	49	-	241	1	47	-	56	8	8	4	-	-	23	1	18
58	1	3	6	32	18	11	-	-	-	15	-	20	5	24	16	3	2	1	2	65	1	19
649	1	64	46	628	187	978	7	838	1	1540	18	370	16	439	232	55	23	27	3	680	8	
59	-	6	-	36	13	140	-	38	-	155	-	37	-	39	7	3	2	-	-	139	-	20
105	-	36	7	78	21	115	-	33	81	1	56	-	44	10	4	3	-	-	-	11	-	21
90	1	2	7	58	27	27	-	64	219	-	59	7	49	36	9	4	3	-	-	17	1	22
52	-	2	5	32	5	121	2	16	-	76	1	34	-	45	23	5	1	3	-	29	1	23
79	-	-	3	48	23	32	-	21	-	133	3	26	-	34	9	2	2	2	2	55	3	24
39	-	1	7	30	13	60	-	23	-	270	1	18	2	44	77	5	1	1	-	38	-	25
30	-	5	1	34	13	33	-	154	-	126	-	24	-	36	9	5	-	4	-	125	1	26
21	-	3	3	42	14	14	-	38	1	160	3	21	3	39	30	2	1	2	-	11	-	27
39	-	5	3	54	6	244	1	324	-	120	-	31	-	33	2	10	1	1	-	130	-	28
66	-	3	3	29	8	13	-	125	-	88	1	38	-	33	3	6	1	3	-	36	-	29
24	-	-	5	3	24	50	4	-	-	50	3	8	4	24	25	3	8	5	1	5	1	30
45	-	1	2	84	20	129	-	2	-	62	-	18	-	19	1	1	1	1	-	84	1	31
641	-	60	75	636	242	3620	9	1898	-	2256	15	354	15	474	263	74	53	22	3	1116	12	
25	-	2	1	19	3	44	-	463	-	68	-	21	-	24	4	6	1	-	-	117	-	32
26	-	-	-	9	6	89	1	2	-	31	-	15	-	16	9	2	2	1	1	9	-	33
17	-	1	1	43	9	171	-	8	-	128	1	14	-	17	5	8	3	1	-	46	1	34
35	-	2	3	22	7	487	-	185	-	36	-	18	2	27	50	1	2	-	-	39	-	35
27	-	1	1	21	6	43	-	169	-	56	1	20	-	16	4	5	2	-	-	9	1	36
19	-	1	2	8	4	15	-	-	155	-	8	-	12	4	1	1	-	-	-	3	-	37
9	-	5	2	11	10	224	1	80	-	43	1	5	1	12	31	5	2	-	-	32	-	38
31	-	-	1	13	7	368	1	3	-	38	-	17	1	15	7	4	-	-	-	94	-	39
9	-	2	1	16	5	6	-	33	-	103	-	7	1	13	3	3	-	-	-	3	-	40
15	-	2	2	12	5	7	-	22	-	39	-	5	-	8	2	2	-	1	-	37	-	41
7	-	2	2	5	6	159	1	-	-	5	-	4	1	7	1	-	1	-	-	3	1	42
16	-	3	5	25	8	127	1	4	-	8	-	8	-	6	11	-	-	1	-	7	-	43
15	-	1	5	20	7	7	-	1	-	85	-	18	-	4	3	2	-	-	-	6	-	44
17	-	3	5	28	10	6	-	5	-	78	1	8	1	19	4	3	1	2	-	5	1	45
12	-	-	1	8	8	47	-	83	-	114	-	6	-	9	7	-	-	-	-	17	-	46
18	-	-	2	6	3	19	-	1	-	10	-	10	-	10	2	3	-	-	-	3	-	47
16	-	3	1	20	3	10	-	193	-	23	-	4	-	8	3	1	-	1	-	33	-	48
18	-	-	1	14	3	12	-	12	-	137	-	12	-	22	31	-	1	-	-	59	-	49
15	-	-	1	12	11	5	-	2	-	39	-	4	-	8	2	3	-	-	-	1	-	50
9	-	-	1	5	1	7	-	11	-	62	-	5	-	6	3	1	-	-	-	33	3	51
18	-	1	3	9	8	391	-	8	-	40	3	10	-	5	2	-	-	-	-	10	-	52
25	-	9	2	11	6	180	-	15	-	59	-	4	-	14	3	-	-	-	-	25	-	53
10	-	-	2	7	6	94	1	2	-	88	-	6	-	12	5	-	1	-	-	14	-	54
19	-	-	1	7	4	6	-	-	-	80	2	11	-	9	4	2	1	1	-	9	-	55
24	-	3	1	11	8	10	-	9	-	17	-	10	-	7	3	2	2	2	1	51	-	56
8	-	3	-	9	5	4	-	18	-	69	1	6	-	12	7	1	2	2	-	-	-	57
15	-	-	4	11	8	123	-	152	-	45	-	7	-	14	2	1	-	3	-	3	-	58
10	-	4	1	13	7	7	-	21	-	42	-	9	-	8	-	1	1	1	-	6	-	59
17	-	-	3	8	18	58	-	4	-	12	-	3	7	10	18	1	-	-	-	22	-	60
17	-	1	2	12	2	24	-	43	-	32	-	12	-	7	3	2	-	1	-	48	-	61
6	-	-	3	6	3	47	-	8	-	6	1	2	-	5	-	3	2	-	-	54	-	62
7	-	-	2	2	1	89	1	3	-	6	-	5	-	11	4	-	-	-	-	-	-	63
11	-	1	1	16	5	140	1	235	-	61	-	10	-	8	2	-	-	-	-	78	1	64
6	-	-	3	2	5	3	1	-	-	19	-	2	-	10	5	1	1	-	-	6	-	65
3	-	-	-	22	7	9	-	2	-	19	-	1	-	5	2	1	2	-	-	1	1	66
16	-	6	3	24	6	7	-	2	-	56	-	14	-	4	1	3	-	-	-	7	-	67
7	-	1	1	5	-	14	-	18	-	61	-	-	-	2	1	2	-	-	-	94	1	68





Gonorrhea		Influenza		Lobar Pneumonia		Measles		Mumps		Scarlet Fever		Syphilis		Tuberculosis, Pulmonary		Tuberculosis, Other Forms		Typhoid Fever		Whooping Cough		Line No.
Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	
17	-	-	-	7	1	21	-	1	-	12	-	5	-	9	3	-	-	-	-	2	-	69
3	-	-	1	6	4	8	-	-	-	56	1	5	-	8	3	-	-	-	-	-	-	70
11	1	1	1	8	3	8	-	-	15	23	-	9	-	12	3	1	-	1	-	27	-	72
7	-	1	1	3	2	357	-	-	13	69	-	4	-	5	-	-	-	-	-	66	-	70
15	1	1	1	9	1	60	-	-	3	29	1	5	1	8	-	-	-	2	-	18	1	73
2	-	-	-	1	1	69	-	-	5	11	-	2	-	8	2	-	-	2	-	5	-	74
4	-	-	-	2	7	-	-	-	-	6	-	2	-	4	1	-	-	-	-	1	-	75
286	1	17	40	211	91	1434	7	846	-	80	2	1	-	18	3	1	1	1	-	13	-	76
6	-	-	-	3	1	4	-	68	-	12	8	171	12	241	101	34	9	23	1	674	4	-
8	-	-	-	20	11	-	1	2	-	42	-	-	-	4	4	2	1	-	-	-	-	77
8	-	-	-	1	3	17	-	4	-	42	-	-	-	5	1	1	1	-	-	-	-	78
5	-	-	-	1	-	55	1	2	-	4	-	-	-	8	3	-	-	3	-	5	-	79
6	-	-	-	12	3	3	-	4	-	19	-	13	1	19	5	1	-	2	-	56	-	80
20	-	-	-	4	2	438	-	5	-	28	-	-	-	3	3	3	-	-	-	10	-	81
2	-	-	-	2	1	3	-	19	-	51	1	3	-	12	7	1	1	-	-	16	-	82
8	-	-	1	2	2	92	-	10	-	3	-	3	-	15	1	5	-	2	-	26	-	83
2	-	-	-	2	1	8	-	68	-	39	1	3	-	9	1	1	-	-	-	67	-	84
10	-	-	-	6	2	71	1	1	-	10	-	9	-	8	1	3	-	-	-	6	-	85
5	-	-	1	1	4	5	2	1	-	36	1	1	-	7	3	-	-	1	1	-	-	86
23	-	-	6	3	11	4	-	54	-	69	-	-	9	5	2	1	-	-	-	40	1	87
5	-	-	3	-	-	-	-	-	-	24	-	-	1	6	1	1	-	1	-	69	-	88
4	-	-	1	7	1	11	-	11	-	24	-	-	-	5	5	-	-	-	-	16	-	89
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9	-	-	-	4	5	3	-	-	-	31	-	-	-	6	2	1	-	1	-	2	-	92
8	-	-	-	4	-	1	-	7	-	35	-	-	-	1	2	-	-	-	-	3	-	93
7	-	-	1	-	-	6	-	-	-	39	-	2	-	2	1	1	-	-	-	14	-	94
3	-	-	1	15	-	47	-	-	-	46	1	1	-	4	4	-	-	-	-	1	-	95
4	-	-	3	2	1	-	-	-	-	49	-	2	-	4	1	-	-	1	-	16	-	96
4	-	-	-	4	1	-	-	-	-	6	1	6	-	5	2	-	1	-	-	-	-	97
8	-	-	5	4	1	20	-	3	-	1	-	-	1	1	13	1	-	-	-	-	1	98
1	-	-	-	3	3	4	-	12	-	50	-	-	-	2	4	1	1	-	-	6	-	99
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1	-	-	1	3	3	4	-	14	-	56	-	-	-	6	3	4	-	-	-	29	-	101
1	-	-	-	3	2	4	-	-	-	12	-	-	-	2	3	2	-	-	-	20	-	102
1	-	-	-	2	-	37	-	1	-	15	-	-	-	2	4	2	-	-	-	-	-	103
10	-	-	1	4	5	7	-	-	-	10	-	-	-	3	3	-	-	1	-	7	-	104
-	-	-	1	5	2	11	-	5	-	7	-	1	-	4	4	-	-	-	-	1	-	105
10	-	1	1	9	8	6	-	3	-	24	-	-	-	1	3	3	1	-	-	1	-	106
9	-	-	3	3	1	66	-	5	-	58	-	5	1	11	14	4	1	-	-	2	-	107
7	-	-	-	7	4	4	-	-	-	5	-	-	-	2	4	-	-	-	-	8	-	108
1	-	-	3	7	4	17	-	40	-	49	-	-	-	-	-	-	-	1	-	19	-	109
8	-	2	1	5	2	1	-	12	-	18	-	-	-	10	1	-	1	-	-	3	-	110
3	-	1	1	10	1	15	-	7	-	21	-	-	-	2	2	-	-	-	-	8	-	111
11	-	-	1	1	2	1	-	1	-	28	-	8	-	-	2	-	-	1	-	-	-	112
12	-	-	2	3	6	-	-	-	-	9	1	9	-	3	1	-	-	2	-	1	-	113
3	-	-	-	3	1	15	-	3	-	7	-	5	-	2	1	-	-	1	-	35	-	114
16	-	-	1	2	2	6	-	-	-	3	-	2	-	9	-	-	-	-	-	13	-	115
9	1	-	1	9	1	98	-	5	-	19	-	10	-	5	-	2	-	1	-	7	-	116
2	-	-	2	1	2	10	1	-	-	13	-	3	-	3	5	1	-	-	-	93	-	117
1	-	-	-	10	3	4	-	3	-	6	-	-	-	-	-	-	-	-	-	-	-	118
4	-	-	-	4	1	1	-	-	-	14	-	4	5	3	2	1	-	-	-	23	-	119
6	-	-	3	4	2	2	-	5	-	1	-	1	1	4	1	-	-	1	-	5	1	120
1	-	1	2	6	3	18	-	14	-	26	2	1	-	2	1	-	-	-	-	10	-	121
-	-	-	3	-	-	-	-	-	-	1	-	-	-	1	3	-	-	-	-	-	-	122
157	-	69	22	70	75	636	3	367	1	13	-	-	-	4	-	-	-	-	-	1	-	123
3	-	-	2	1	1	23	-	4	-	28	5	114	9	136	241	15	13	12	-	332	7	124
16	-	1	4	2	1	14	-	80	-	4	-	1	-	10	1	2	-	-	-	98	-	125
2	-	-	-	12	3	1	44	-	-	15	-	2	1	2	8	1	-	-	-	2	1	126
-	-	-	1	5	-	-	-	-	-	12	-	-	-	1	2	-	-	-	-	-	-	127
1	-	-	-	2	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	128
2	-	-	-	1	-	70	-	-	-	7	1	-	-	1	2	-	-	-	-	4	-	129
3	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	130
5	-	-	-	-	3	1	-	-	-	2	-	-	-	2	2	-	-	-	-	-	-	131
-	-	-	-	3	1	-	-	-	-	1	-	-	-	2	2	-	-	-	-	-	-	132
3	-	1	1	3	2	3	-	-	-	18	-	1	1	20	21	1	-	-	-	-	-	133
9	-	-	1	-	1	11	-	-	-	2	-	-	-	5	2	1	1	-	-	-	-	134
6	-	21	1	1	1	-	-	-	-	4	-	-	-	2	1	1	1	-	-	1	-	135
2	-	-	-	1	1	-	-	-	-	10	-	2	-	1	1	-	-	-	-	-	-	136
3	-	-	1	-	1	4	-	45	-	21	-	3	1	3	2	-	-	-	-	7	-	137
-	-	-	-	-	2	-	-	-	-	8	-	-	-	4	2	-	-	-	-	-	1	138
-	-	-	-	-	-	-	-	-	-	-	-	3	1	-	-	-	-	-	-	-	-	139
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	140

## Cases and Deaths from Diseases Dangerous

Line No.	CITIES AND TOWNS IN ORDER OF POPULATION	Popu- lation estimated as of July 1, 1932	An- terior Polio- mye- litis		Chicken Pox		Diph- theria		Dog Bite		Ep. Cere- bro- spinal Menin- gitis		Ger- man Mea- sles	
			Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths
141	Oxford	3,909	-	-	3	-	2	-	-	-	-	-	-	-
142	Williamstown	3,855	-	-	3	-	-	-	-	-	-	-	-	-
143	Provincetown	3,816	-	-	4	-	1	-	-	-	-	-	-	-
144	Wrentham	3,748	-	-	32	-	3	-	-	-	-	-	-	-
145	Warren	3,684	-	-	12	-	1	-	8	-	-	-	2	-
146	East Bridgewater	3,611	-	-	-	-	1	-	-	-	-	-	-	-
147	Westford	3,610	-	-	12	-	1	-	5	-	-	-	-	-
148	Barre	3,591	-	-	-	-	-	-	-	-	-	-	-	-
149	Weston	3,523	-	-	22	-	1	-	13	-	-	-	2	-
150	Rockport	3,490	-	-	1	-	-	-	2	-	-	-	-	-
151	Sharon	3,453	-	-	4	-	10	1	-	-	-	-	-	-
152	East Longmeadow	3,412	-	-	1	-	-	-	7	-	-	-	-	-
153	Holbrook	3,386	-	-	10	-	-	-	7	-	-	-	1	-
154	Bellingham	3,328	-	-	-	-	1	-	-	-	-	-	-	-
155	Scituate	3,298	-	-	-	-	1	-	2	-	-	-	-	-
156	West Bridgewater	3,244	-	-	-	-	1	-	1	-	-	-	1	-
157	Belchertown	3,242	-	-	-	-	-	-	-	-	-	-	-	-
158	Wayland	3,242	-	-	34	-	-	-	3	-	-	-	-	-
159	Cohasset	3,157	-	-	-	-	-	-	-	-	-	-	1	-
160	Medway	3,155	-	-	-	-	-	-	-	-	-	-	-	-
161	Dighton	3,120	1	-	-	-	-	-	5	-	-	-	-	-
162	Bedford	3,091	-	-	12	-	-	-	2	-	-	-	-	-
163	Ayer	3,070	-	-	14	-	-	-	2	-	-	-	1	-
164	North Brookfield	3,000	-	-	-	-	-	-	-	-	-	-	-	-
165	Lancaster	2,993	-	-	23	-	-	-	4	-	-	-	1	-
166	Pepperell	2,984	-	-	4	-	-	-	-	-	-	-	-	-
167	Hopedale	2,888	-	-	3	-	4	-	-	-	-	-	1	-
168	Holliston	2,885	-	-	2	-	-	-	1	-	-	-	-	-
169	Deerfield	2,846	-	-	8	-	-	-	-	-	-	-	-	-
170	Bourne	2,841	-	-	-	-	-	-	-	-	-	-	-	-
171	Hanover	2,829	-	-	51	-	-	-	-	-	1	-	-	-
172	Kingston	2,736	-	-	8	-	-	-	3	-	-	-	-	-
173	Rehoboth	2,733	-	-	-	-	-	-	-	-	-	-	-	-
174	Norton	2,724	-	-	2	-	-	-	-	-	-	-	-	-
175	Manchester	2,694	-	-	-	-	-	-	-	-	-	-	-	-
176	Lenox	2,675	-	-	-	-	-	-	1	-	-	-	-	-
177	Wilbraham	2,669	-	-	25	-	-	-	1	-	-	-	-	-
178	Hadley	2,592	-	-	-	-	1	-	-	-	1	-	-	-
179	Hopkinton	2,559	-	-	7	-	-	-	9	-	-	-	-	-
180	Rutland	2,538	-	-	-	-	-	-	-	-	-	-	-	-
181	Acton	2,522	-	-	-	-	-	-	2	-	-	-	-	-
	Towns of 1,000-2,500	167,456	4	-	381	-	40	1	73	-	-	-	25	-
182	Harwich	2,441	-	-	-	-	2	-	-	-	-	-	-	-
183	Shirley	2,441	-	-	1	-	3	-	5	-	-	-	-	-
184	Avon	2,436	-	-	23	-	-	-	1	-	-	-	1	-
185	Groton	2,436	-	-	8	-	-	-	-	-	-	-	-	-
186	Merrimac	2,410	-	-	3	-	-	-	4	-	-	-	-	-
187	Hatfield	2,377	-	-	-	-	-	-	2	-	-	-	2	-
188	Salisbury	2,361	-	-	-	-	-	-	-	-	-	-	-	-
189	Ashland	2,343	-	-	-	-	-	-	5	-	-	-	1	-
190	Groveland	2,273	-	-	16	-	2	-	-	-	-	-	-	-
191	Westwood	2,272	-	-	-	-	-	-	-	-	-	-	-	-
192	Southboro	2,214	-	-	-	-	-	-	3	-	-	-	-	-
193	West Boylston	2,202	-	-	3	-	-	-	-	-	-	-	2	-
194	Hardwick	2,199	-	-	-	-	-	-	-	-	-	-	-	-
195	Hanson	2,192	-	-	-	-	-	-	-	-	-	-	1	-
196	Raynham	2,138	-	-	-	-	-	-	-	-	-	-	-	-
197	Sutton	2,138	-	-	-	-	-	-	-	-	-	-	-	-
198	Douglas	2,120	-	-	6	-	-	-	-	-	-	-	-	-
199	Charlton	2,092	-	-	-	-	-	-	-	-	-	-	-	-
200	North Reading	2,057	-	-	29	-	-	-	-	-	-	-	-	-
201	Hamilton	2,055	-	-	-	-	-	-	-	-	-	-	-	-
202	Ashburnham	2,045	-	-	2	-	-	-	-	-	-	-	1	-
203	Upton	2,041	1	-	21	-	1	-	1	-	-	-	-	-
204	Chatham	2,014	-	-	-	-	1	-	-	-	-	-	-	-
205	Millville	1,999	-	-	-	-	1	-	-	-	-	-	-	-
206	Lunenburg	1,944	-	-	11	-	-	-	-	-	-	-	2	-
207	Westminster	1,940	-	-	-	-	-	-	-	-	-	-	-	-
208	Northboro	1,939	-	-	1	-	-	-	3	-	-	-	-	-
209	Northfield	1,917	-	-	2	-	-	-	-	-	-	-	-	-
210	Yarmouth	1,910	-	-	1	-	-	-	-	-	-	-	-	-
211	Dennis	1,864	-	-	1	-	9	1	1	-	-	-	1	-
212	Burlington	1,852	-	-	3	-	-	-	-	-	-	-	-	-
213	Williamsburg	1,846	-	-	21	-	2	-	-	-	-	-	-	-



Gonor- rhea		Influ- enza		Lobar Pneumonia		Measles		Mumps		Scarlet Fever		Syphi- lis		Tuber- culosis, Pulmo- nary		Tuber- culosis Other Forms		Ty- phoid Fever		Whoop- ing Cough		Line No.
Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	
1	2	-	-	1	2	74	-	1	-	9	-	1	-	1	-	-	-	-	-	-	-	141
2	-	-	-	-	5	63	-	-	-	-	-	2	-	1	-	-	-	-	-	2	-	142
4	-	-	-	-	3	3	-	-	-	33	1	1	-	-	-	-	-	-	-	-	-	143
5	-	-	-	10	3	1	-	38	-	13	-	2	-	22	17	3	1	-	-	-	-	144
3	-	-	-	1	1	2	-	1	-	13	-	2	-	1	-	-	-	-	-	32	1	145
5	-	-	-	-	-	1	-	-	-	10	-	4	-	1	-	-	-	-	-	-	-	146
2	-	-	-	-	-	3	-	1	-	12	-	1	-	1	-	-	-	1	-	-	-	147
2	-	-	-	-	1	-	-	-	-	6	1	1	-	3	3	-	-	-	-	-	-	148
1	-	45	-	2	1	10	-	11	-	4	-	-	-	1	1	1	-	-	-	56	-	149
1	-	-	-	-	-	6	-	-	-	21	-	-	-	2	1	1	-	-	-	2	-	150
1	-	-	-	1	2	8	-	26	-	5	-	1	-	8	-	-	-	-	-	-	-	151
-	-	-	-	1	1	1	-	5	-	19	-	1	-	-	-	1	-	-	-	-	-	152
3	-	-	-	-	2	38	1	-	-	-	-	6	-	3	-	-	-	-	-	8	-	153
2	-	-	-	-	-	1	-	-	-	3	-	1	-	-	3	-	1	-	-	-	-	154
1	-	-	-	2	1	-	-	5	-	19	-	1	-	2	-	-	-	-	-	30	1	155
1	-	-	-	2	1	48	1	1	-	5	1	-	-	1	2	1	-	-	-	1	1	156
4	-	-	-	1	3	-	-	-	1	1	-	1	-	1	-	-	-	-	-	-	-	157
4	-	1	-	-	1	49	-	41	-	8	-	5	-	1	-	-	-	-	-	-	-	158
4	-	-	-	-	-	2	-	1	-	9	-	-	-	3	-	1	1	-	-	7	-	159
5	-	-	-	1	1	-	-	-	-	41	-	-	-	-	-	1	-	-	-	-	-	160
1	-	-	-	1	1	3	-	-	-	19	-	-	-	4	1	-	1	-	-	-	-	161
1	-	-	-	2	-	-	-	5	-	-	-	2	-	-	-	-	-	-	-	-	-	162
1	-	-	-	3	6	2	-	4	-	4	-	2	-	1	1	1	-	-	-	2	-	163
11	-	-	-	1	1	13	-	-	-	5	-	-	-	1	1	-	-	-	-	-	-	164
5	-	-	-	2	1	1	-	16	-	1	-	17	-	3	1	-	-	-	-	7	-	165
4	-	-	-	-	1	1	-	10	-	3	-	3	-	-	1	-	-	-	-	1	-	166
2	-	-	-	10	4	1	-	1	-	49	-	2	-	2	-	-	-	1	-	-	-	167
2	-	-	-	1	1	34	-	2	-	7	-	1	-	1	1	-	-	-	-	-	-	168
7	-	-	-	1	1	-	-	-	-	-	-	2	-	1	1	-	-	-	-	-	-	169
3	-	-	-	-	-	-	-	-	-	-	7	2	-	1	1	1	4	-	-	-	-	170
1	-	-	-	-	-	122	-	-	-	3	-	-	-	1	1	1	-	1	-	55	-	171
1	-	-	-	3	-	2	-	-	-	4	-	-	-	5	1	-	-	-	-	-	-	172
1	-	-	-	-	-	-	-	-	-	5	-	-	-	-	1	1	-	-	-	-	-	173
4	-	-	-	-	-	2	-	-	-	13	-	3	-	3	-	-	-	-	-	-	-	174
3	-	-	-	1	-	-	-	-	-	-	-	1	-	1	-	-	-	-	-	-	-	175
3	-	-	-	2	-	16	-	-	-	1	-	2	-	2	2	-	-	-	-	4	-	176
1	-	-	-	-	-	-	-	-	-	2	-	-	-	2	-	-	-	-	-	-	-	177
1	-	-	-	2	1	1	-	-	-	-	-	-	-	1	-	-	-	-	-	2	-	178
1	-	-	-	2	2	-	-	6	-	11	-	-	-	2	-	1	1	-	-	1	-	179
1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	180
141	-	15	11	66	89	1007	2	453	-	321	4	85	3	76	138	11	19	12	-	400	2	181
4	-	-	-	-	-	-	-	-	-	-	-	1	1	4	1	1	-	-	-	-	-	182
2	-	-	-	13	2	-	-	34	-	16	-	-	-	4	-	-	-	-	-	17	-	183
1	-	-	-	-	-	66	-	1	-	1	-	-	-	2	-	-	-	-	-	31	-	184
-	-	-	-	-	-	7	-	6	-	2	-	-	-	-	1	-	-	-	-	2	-	185
2	-	-	-	4	2	2	-	1	-	1	-	4	-	1	-	-	-	-	-	-	-	186
1	-	-	-	-	-	27	-	5	-	1	-	-	-	3	-	-	-	-	-	-	-	187
1	-	-	-	1	-	2	-	1	-	6	-	2	-	1	-	-	-	1	-	-	-	188
2	-	-	-	-	-	2	-	1	-	8	-	-	-	2	-	-	-	-	-	-	-	189
3	-	-	-	4	-	170	-	4	-	3	-	1	-	1	-	-	-	-	-	3	-	190
-	-	1	-	1	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	191
3	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	192
1	-	-	-	-	3	-	-	8	-	2	-	-	-	-	-	-	-	-	-	-	-	193
1	-	-	-	1	1	-	-	1	-	8	-	-	-	2	1	-	-	-	-	17	-	194
1	-	-	-	-	-	4	-	2	-	1	-	-	-	3	30	-	-	-	-	-	-	195
3	-	-	-	-	-	-	-	-	-	1	-	2	-	2	1	-	-	-	-	-	-	196
1	-	-	-	2	-	3	-	7	-	3	-	1	-	2	-	-	-	1	-	1	-	197
1	-	-	-	-	-	23	-	138	-	3	-	1	-	3	-	-	-	-	-	-	-	198
6	-	-	-	-	-	-	-	-	-	4	-	1	-	-	12	-	-	-	-	-	-	199
2	-	-	-	1	1	3	-	-	-	1	-	1	-	1	-	-	-	-	-	-	-	200
-	-	2	-	-	-	-	-	-	-	8	-	-	-	2	1	-	1	-	-	-	-	201
1	-	-	-	4	2	5	-	60	-	11	-	-	-	1	-	-	-	-	-	6	-	202
4	-	-	-	2	1	-	-	-	-	-	-	1	-	4	3	-	-	-	-	2	-	203
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	204
1	-	-	-	1	1	1	-	10	-	6	2	-	-	1	1	1	1	-	-	-	-	205
1	-	-	-	-	-	-	-	15	-	3	-	-	-	1	-	-	-	-	-	-	-	206
2	-	1	-	2	-	25	-	4	-	4	-	2	-	1	1	1	-	-	-	23	1	207
1	-	-	-	1	2	118	-	1	-	1	-	-	-	-	-	-	-	-	-	3	-	208
4	-	-	-	-	-	2	-	-	-	2	-	2	-	-	1	-	-	-	-	3	-	209
5	-	-	-	-	1	-	-	-	-	1	-	1	-	4	-	-	-	-	-	-	-	210
3	-	-	-	-	1	11	-	-	-	12	-	1	-	2	-	-	-	-	-	-	-	211
3	-	-	-	-	-	-	-	-	-	2	-	-	-	1	-	-	-	-	-	-	-	212
3	-	-	-	2	1	42	-	-	-	2	-	1	-	1	-	-	-	-	-	-	-	213



## 77

Gonor- rhea		Influ- enza		Lobar Pneu- monia		Measles		Mumps		Scarlet Fever		Syphi- lis		Tuber- culosis, Pulmo- nary		Tuber- culosis, Other Forms		Ty- phoid Fever		Whoop- ing Cough		Line No.
Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	
1	-	-	-	1	1	50	-	-	-	3	-	2	-	-	-	-	-	-	-	46	-	214
3	-	-	-	1	-	1	-	4	-	1	1	1	-	5	-	1	-	1	-	1	-	215
6	-	-	-	-	-	-	-	-	-	1	1	1	-	-	-	-	-	-	-	-	-	216
1	-	-	-	-	1	2	-	-	-	-	-	2	-	1	-	-	-	5	-	4	-	217
2	-	-	-	-	-	-	-	-	-	-	-	-	2	1	62	-	-	-	-	-	-	218
-	-	-	-	1	-	4	-	1	-	3	-	-	-	-	1	-	-	-	-	-	-	219
-	-	-	-	1	-	5	-	-	-	2	-	-	-	-	-	-	-	-	-	4	-	220
3	-	-	-	1	-	9	-	40	-	11	-	1	-	4	-	1	-	-	-	77	-	222
-	-	1	-	1	-	3	-	1	-	-	-	2	-	-	-	-	-	-	-	14	-	223
2	-	-	-	1	-	5	-	-	-	1	-	1	-	-	-	-	-	-	-	22	-	224
4	-	-	-	1	-	5	-	-	-	1	-	-	-	-	1	-	1	-	-	-	-	225
1	-	-	-	1	-	27	-	1	-	-	-	-	-	1	-	-	-	1	-	-	-	226
-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	227
3	-	-	-	-	-	-	-	-	-	6	-	1	-	2	-	-	-	-	-	-	-	228
1	-	-	-	1	-	11	-	1	-	4	-	-	-	2	5	11	-	-	-	-	-	229
-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	-	-	-	-	-	-	230
1	-	6	-	1	-	55	-	3	-	4	-	-	-	-	-	-	-	-	-	6	-	231
2	-	-	-	-	-	14	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	232
1	-	-	-	-	-	16	-	10	-	5	-	3	-	3	-	-	-	-	-	15	-	233
6	-	-	-	1	-	47	1	2	-	7	-	-	-	-	-	-	-	-	-	-	-	234
1	-	-	-	3	-	6	-	1	-	-	-	-	-	1	-	1	-	-	-	-	-	235
1	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	7	1	236
2	-	-	-	1	-	1	-	-	-	8	-	1	-	-	2	-	-	-	-	-	-	237
1	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	238
3	-	-	-	1	-	-	-	6	-	-	1	2	-	-	-	-	-	-	-	-	-	239
1	-	-	-	1	-	10	-	-	-	14	-	1	-	-	-	1	-	-	-	-	-	240
4	-	-	-	3	-	2	-	24	-	4	-	-	-	-	-	1	1	1	-	42	-	241
-	-	-	-	1	-	3	-	6	-	3	-	-	-	-	-	-	-	-	-	-	-	242
2	-	-	-	1	-	2	-	2	-	3	-	1	-	1	-	-	-	-	-	18	-	243
1	-	-	-	-	-	3	-	1	-	41	-	-	-	-	-	-	-	-	-	1	-	244
2	-	-	-	-	-	-	-	-	-	7	-	-	-	1	-	-	-	-	-	-	-	245
1	-	-	-	2	-	4	-	23	-	-	-	1	-	-	1	-	-	-	-	-	-	246
2	-	-	-	1	-	1	-	-	-	14	-	6	-	1	-	1	-	-	-	8	-	247
7	-	-	-	1	-	1	-	-	-	1	-	3	-	-	2	-	-	-	-	-	-	248
2	-	1	-	-	-	1	-	-	-	1	-	3	-	-	-	1	-	-	-	-	-	249
-	-	-	-	1	-	3	-	12	-	1	-	1	-	-	-	-	-	-	-	2	-	250
-	-	-	-	-	-	8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	251
2	-	-	-	2	-	18	-	1	-	17	1	-	-	1	-	-	-	-	-	1	-	252
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	253
-	-	-	-	1	-	3	-	1	-	1	-	-	-	-	1	1	-	-	-	5	-	254
-	-	-	-	-	-	133	-	1	-	-	-	1	-	-	-	-	-	-	-	-	-	255
3	-	-	-	1	-	-	-	-	-	2	-	1	-	2	-	-	-	-	-	17	-	256
2	-	1	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	257
1	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	1	-	-	-	-	-	258
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1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	263
2	-	1	-	-	-	3	-	-	-	8	-	-	-	1	-	-	-	-	-	-	-	264
-	-	-	-	-	-	6	-	1	-	-	-	-	-	-	-	-	-	1	-	1	-	265
-	-	-	-	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	266
2	-	-	-	1	-	8	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	267
-	-	-	-	-	-	32	-	-	-	1	-	2	-	1	-	-	-	-	-	-	-	268
-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	269
-	-	2	-	-	-	-	-	-	-	2	-	2	-	-	-	-	-	-	-	-	-	270
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3	-	-	-	-	1	-	-	-	-	1	-	-	-	-	-	1	-	-	-	1	-	272
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-	-	1	-	2	-	13	-	-	-	8	-	-	-	-	1	-	-	-	-	-	-	276
28	-	11	9	17	14	229	-	146	-	62	1	9	-	12	9	3	1	2	-	46	1	277
-	-	-	1	-	-	1	-	10	-	7	-	-	-	1	-	-	-	-	-	4	-	278
2	-	1	-	-	-	2	-	1	-	1	-	-	-	-	-	1	-	1	-	-	-	279
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1	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	281
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2	-	-	-	1	2	66	-	-	-	2	-	-	-	-	1	-	-	-	-	-	-	283
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-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	286



## Cases and Deaths from Diseases Dangerous

Line No.	CITIES AND TOWNS IN ORDER OF POPULATION	Popu- lation esti- mated as of July 1, 1932	An- terior Poli- mye- litis		Chicken Pox		Diph- theria		Dog Bite		Ep. Cere- bro- spinal Mening- itis		Ger- man Meas- les	
			Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths
287	Ashfield	837	-	-	-	-	-	-	-	-	-	-	-	-
288	Charlemont	816	-	-	-	-	-	-	-	-	-	-	-	-
289	New Marlboro	808	-	-	6	-	-	-	1	-	-	-	-	-
290	Halifax	773	-	-	-	-	-	-	-	-	-	-	-	-
291	Brewster	769	-	-	1	-	-	-	-	-	-	-	-	-
292	Bolton	749	-	-	-	-	-	-	-	-	-	-	-	-
293	Royalston	712	-	-	-	-	1	-	-	-	-	-	-	-
294	Hampden	706	1	-	-	-	-	-	-	-	-	-	-	-
295	Paxton	706	-	-	-	-	-	-	-	-	-	-	-	-
296	Granville	701	-	-	-	-	-	-	-	-	-	-	-	-
297	Princeton	692	-	-	-	-	-	-	-	-	-	-	-	-
298	Boxford	681	-	-	-	-	-	-	-	-	-	-	-	-
299	Leverett	681	-	-	-	-	-	-	-	-	-	-	-	-
300	Petersham	660	-	-	1	-	-	-	-	-	-	-	-	-
301	Becket	627	-	-	8	-	-	-	-	-	-	-	-	-
302	Blandford	592	-	-	-	-	-	-	-	-	-	-	-	-
303	Carlisle	592	-	-	-	-	-	-	-	-	-	-	-	-
304	Richmond	567	-	-	1	-	-	-	-	-	-	-	-	-
305	Eastham	563	-	-	-	-	-	-	-	-	-	-	-	-
306	Cummington	539	-	-	-	-	-	-	-	-	-	-	1	-
307	Egremont	528	-	-	5	-	-	-	-	-	-	-	-	-
308	Truro	515	-	-	-	-	-	-	-	-	-	-	-	-
309	Plympton	511	-	-	-	-	3	-	1	-	-	-	-	-
310	Worthington	508	-	-	-	-	-	-	-	-	-	-	-	-
311	Oakham	495	-	-	-	-	-	-	-	-	-	-	-	-
312	Dana	438	-	-	-	-	-	-	-	-	-	-	-	-
313	Pelham	428	-	-	-	-	-	-	1	-	-	-	-	-
314	Chesterfield	411	-	-	-	-	-	-	1	-	-	-	7	-
315	New Braintree	403	-	-	-	-	-	-	-	-	-	-	-	-
316	Dunstable	402	-	-	1	-	-	-	1	-	-	-	-	-
317	Sandisfield	389	-	-	-	-	-	-	1	-	-	-	-	-
318	Westhampton	389	-	-	-	-	-	-	1	-	-	-	-	-
319	Mashpee	388	-	-	-	-	-	-	-	-	-	-	-	-
320	Windsor	387	-	-	-	-	-	-	-	-	-	-	-	-
321	Enfield	385	-	-	1	-	-	-	-	-	-	-	-	-
322	New Salem	379	-	-	-	-	-	-	-	-	-	-	-	-
323	Warwick	369	-	-	-	-	-	-	-	-	-	-	-	-
324	Otis	358	-	-	-	-	-	-	2	-	-	-	-	-
325	Phillipston	346	-	-	-	-	-	-	-	-	-	-	-	-
326	Heath	344	-	-	-	-	-	-	-	-	-	-	-	-
327	Wendell	335	-	-	-	-	-	-	-	-	-	-	-	-
328	Wales	328	-	-	-	-	-	-	-	-	-	-	-	-
329	Plainfield	317	-	-	-	-	-	-	-	-	-	-	-	-
330	Monterey	312	-	-	-	-	-	-	-	-	-	-	-	-
331	Boxboro	305	-	-	-	-	-	-	-	-	-	-	-	-
332	Rowe	300	-	-	-	-	-	-	-	-	-	-	-	-
333	Hancock	293	-	-	-	-	-	-	-	-	-	-	-	-
334	Hawley	297	-	-	-	-	-	-	-	-	-	-	-	-
335	Florida	284	-	-	-	-	-	-	-	-	-	-	-	-
336	Savoy	267	-	-	-	-	-	-	-	-	-	-	-	-
337	Leyden	260	-	-	-	-	-	-	-	-	-	-	-	-
338	Chilmark	256	-	-	-	-	-	-	-	-	-	-	-	-
339	Monroe	249	-	-	-	-	-	-	-	-	-	-	-	-
340	Goshen	248	-	-	-	-	-	-	-	-	-	-	-	-
341	West Tisbury	243	-	-	-	-	-	-	-	-	-	-	-	-
342	Tyringham	233	-	-	2	-	-	-	-	-	-	-	-	-
343	Shutesbury	226	-	-	-	-	-	-	-	-	-	-	-	-
344	Washington	220	-	-	-	-	-	-	-	-	-	-	-	-
345	Alford	194	-	-	-	-	-	-	1	-	-	-	-	-
346	Middlefield	188	-	-	-	-	-	-	-	-	-	-	-	-
347	Gay Head	159	-	-	-	-	-	-	-	-	-	-	-	-
348	Greenwich	144	-	-	-	-	-	-	-	-	-	-	-	-
349	Holland	137	-	-	-	-	-	-	-	-	-	-	-	-
350	Tolland	130	-	-	-	-	-	-	-	-	-	-	-	-
351	Montgomery	121	-	-	-	-	-	-	-	-	-	-	-	-
352	Gosnold	113	-	-	-	-	-	-	-	-	-	-	-	-
353	Peru	108	-	-	-	-	-	-	-	-	-	-	-	-
354	New Ashford	75	-	-	-	-	-	-	-	-	-	-	-	-
355	Mount Washington	60	-	-	-	-	-	-	-	-	-	-	-	-
356	Tewksbury State Infirmary	-	-	-	-	-	-	-	-	-	1	-	-	-
357	Out of State	-	1	-	1	-	2	-	-	-	2	-	-	-

Gonor- rhea		Influenza		Lobar Pneu- monia		Measles		Mumps		Scarlet Fever		Syphi- lis		Tuber- culosis, Pulmo- nary		Tuber- culosis, Other Forms		Ty- phoid Fever		Whoop- ing Cough		Line No.
Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	
1	1	-	-	1	1	4	-	-	-	-	-	-	-	1	2	-	-	-	-	-	-	287
1	2	-	-	-	-	4	-	-	-	2	-	1	-	1	-	-	-	-	-	7	-	288
-	-	1	-	3	3	1	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	289
-	-	-	-	-	-	5	-	29	-	2	4	-	-	-	1	-	-	-	-	-	-	290
1	-	-	-	1	1	4	2	-	-	3	1	-	-	2	-	1	-	-	-	-	-	291
-	-	-	-	1	1	2	-	-	-	4	4	1	-	2	-	1	-	-	-	1	-	292
-	-	-	2	1	-	49	-	-	-	2	2	1	-	2	1	-	-	-	-	1	-	293
4	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	294
1	1	-	-	2	-	28	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	295
1	1	-	1	-	-	-	-	31	-	-	-	4	-	-	-	-	-	1	-	-	-	296
1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	297
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	298
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-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	300
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6	-	301
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	302
-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	303
-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	304
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-	-	-	-	-	-	43	-	20	-	1	-	-	-	-	-	-	-	-	-	-	-	314
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-	-	3	-	-	-	5	22	32	1	-	-	-	-	4	52	78	3	-	-	-	-	357
-	-	-	-	-	-	3	-	1	-	6	-	-	-	-	6	-	-	1	-	-	-	-

In addition to the foregoing  
there occurred 2 cases of  
*actinomyces* with 1 death:

	Cases	Deaths
Milton . . . . .	1	-
Waltham . . . . .	1	1

1 case of *anthrax* with 1 death:

Attleboro . . . . .	-	1
Lynn . . . . .	1	-

65 cases of *dysentery* with 5 deaths:

<i>Amebic:</i>		
Andover . . . . .	1	-
Chelsea . . . . .	1	-
Haverhill . . . . .	1	1
Leominster . . . . .	1	-
Winthrop . . . . .	-	1

<i>Bacillary:</i>		
Boston . . . . .	-	1
Danvers . . . . .	1	-
Dedham . . . . .	1	-
Frammingham . . . . .	-	1
Georgetown . . . . .	-	1
Lynn . . . . .	1	-
Medfield . . . . .	43	-
Medford . . . . .	1	-
New Bedford . . . . .	1	-
Plymouth . . . . .	2	-
Wellesley . . . . .	1	-
Worcester . . . . .	3	-

<i>Not stated:</i>		
Boston . . . . .	1	-
Cambridge . . . . .	1	-
Chelsea . . . . .	1	-
Reading . . . . .	1	-
Somerville . . . . .	1	-
Wakefield . . . . .	1	-
Wilmington . . . . .	1	-

22 cases of *encephalitis lethargica*  
with 19 deaths:

Belmont . . . . .	1	-
Beverly . . . . .	-	1
Boston . . . . .	-	2
Braintree . . . . .	-	1
Cambridge . . . . .	1	-
Chicopee . . . . .	2	-
Erving . . . . .	1	-
Everett . . . . .	1	1
Greenfield . . . . .	-	1
Holden . . . . .	-	1
Lawrence . . . . .	-	1
Malden . . . . .	1	2
Northampton . . . . .	6	3
Pittsfield . . . . .	1	-
Quincy . . . . .	1	-
Salem . . . . .	3	2
Springfield . . . . .	1	1
Tewksbury State Infirmary . . . . .	-	1
Winchendon . . . . .	1	1
Worcester . . . . .	1	1
Out of State . . . . .	1	-

14 cases of *malaria* with 4 deaths:

Agawam . . . . .	-	1
Athol . . . . .	1	1
Cambridge . . . . .	2	-
Chelsea . . . . .	6*	-
Easton . . . . .	1	-
Gloucester . . . . .	1	-
Medford . . . . .	-	1
Worcester . . . . .	1	1

*Therapeutic cases:*

Boston . . . . .	1	-
Medfield . . . . .	1	-

1,138 cases of *ophthalmia neonatorum*  
with 1 death:

Adams . . . . .	2	-
Andover . . . . .	1	-
Arlington . . . . .	6	1
Athol . . . . .	1	-
Barnstable . . . . .	2	-
Belmont . . . . .	2	-
Beverly . . . . .	1	-

	Cases	Deaths
Boston . . . . .	555	-
Braintree . . . . .	2	-
Brewster . . . . .	1	-
Brockton . . . . .	112	-
Cambridge . . . . .	15	-
Chelmsford . . . . .	1	-
Chelsea . . . . .	6	-
Chicopee . . . . .	2	-
Danvers . . . . .	1	-
Dartmouth . . . . .	3	-
Dedham . . . . .	1	-
Everett . . . . .	6	-
Fairhaven . . . . .	5	-
Fall River . . . . .	31	-
Fitchburg . . . . .	3	-
Franklin . . . . .	2	-
Gardner . . . . .	3	-
Gloucester . . . . .	1	-
Greenfield . . . . .	2	-
Haverhill . . . . .	4	-
Holyoke . . . . .	5	-
Lawrence . . . . .	98	-
Lowell . . . . .	5	-
Ludlow . . . . .	1	-
Lynn . . . . .	5	-
Malden . . . . .	7	-
Mansfield . . . . .	6	-
Marlborough . . . . .	1	-
Mattapoisett . . . . .	3	-
Medford . . . . .	10	-
Melrose . . . . .	9	-
Millbury . . . . .	1	-
Milton . . . . .	2	-
Needham . . . . .	1	-
New Bedford . . . . .	61	-
Newton . . . . .	1	-
Northampton . . . . .	3	-
Pittsfield . . . . .	4	-
Quincy . . . . .	2	-
Revere . . . . .	5	-
Salem . . . . .	2	-
Seekonk . . . . .	1	-
Shrewsbury . . . . .	1	-
Somerville . . . . .	11	-
Southbridge . . . . .	2	-
Springfield . . . . .	46	-
Swampscott . . . . .	4	-
Taunton . . . . .	1	-
Tewksbury State Infirmary . . . . .	1	-
Upton . . . . .	1	-
Wareham . . . . .	1	-
Watertown . . . . .	4	-
Wellesley . . . . .	1	-
West Bridgewater . . . . .	1	-
Winchendon . . . . .	2	-
Winthrop . . . . .	1	-
Worcester . . . . .	56	-
Yarmouth . . . . .	1	-

11 cases of *paratyphoid fever*:

Brookline . . . . .	1	-
Dudley . . . . .	1	-
Fairhaven . . . . .	1	-
Melrose . . . . .	1	-
New Bedford . . . . .	3	-
Southbridge . . . . .	2	-
Weymouth . . . . .	1	-
Worcester . . . . .	1	-

17 cases of *pellagra* with 8 deaths:

Acton . . . . .	1	-
Boston . . . . .	6	3
Cambridge . . . . .	1	-
Fall River . . . . .	-	1
Gardner . . . . .	2	-
Haverhill . . . . .	1	1
Millbury . . . . .	1	-
Newburyport . . . . .	1	-
Pittsfield . . . . .	-	1
Waltham . . . . .	1	-
Winchester . . . . .	1	-
Worcester . . . . .	1	2
Out of State . . . . .	1	-

232 cases of *septic sore throat*  
with 37 deaths:

Abington . . . . .	1	-
Amesbury . . . . .	7	-
Andover . . . . .	1	2



	Cases	Deaths
Arlington	3	—
Ashby	1	1
Attleboro	1	1
Bedford	1	—
Belmont	2	1
Boston	89	10
Brookfield	1	—
Cambridge	7	3
Chelsea	4	1
Chicopee	1	—
Concord	1	—
Danvers	—	1
Dartmouth	2	—
Fall River	4	1
Fitchburg	—	1
Framingham	2	—
Great Barrington	1	—
Greenfield	2	1
Haverhill	6	—
Holyoke	1	—
Hull	—	1
Leominster	1	1
Lowell	12	2
Lynn	8	—
Lynnfield	1	—
Malden	4	1
Medford	6	—
Methuen	1	—
Middleton	1	—
Milford	1	—
Millbury	—	1
Natick	1	—
New Bedford	2	—
Newton	4	—
Northampton	3	—
Northfield	3	—
Norwood	—	1
Palmer	3	—
Petersham	1	—
Quincy	3	1
Salem	—	1
Saugus	3	—
Somerville	4	—
Springfield	—	1
Templeton	—	1
Topsfield	14	—
Tyngsborough	1	—
Walpole	1	—
Wareham	3	—
Watertown	2	—
Weymouth	1	—
Winchester	1	—
Winthrop	3	—
Worcester	6	3

43 cases of *smallpox*:

Boston	1	—
Fitchburg	36	—
Gardner	1	—
Leominster	1	—
Pittsfield	2	—
Worcester	2	—

19 cases of *tetanus* with 19 deaths:

Bedford	1	—
Boston	2	5
Cambridge	1	—
Chicopee	1	—
East Longmeadow	1	—
Fall River	2	1
Foxborough	1	—
Leominster	1	—
Lynn	2	1
Marlborough	—	1
Medway	—	1
Melrose	—	1
Milford	—	1
Montague	—	1
Norwood	—	1
Oak Bluffs	1	1
Peabody	1	1
Salem	1	1
Sharon	1	—
Springfield	1	3
Worcester	1	—
Out of State	1	—

39 cases of *trachoma*:

	Cases	Deaths
Boston	14	—
Brockton	1	—
Chelmsford	1	—
East Bridgewater	1	—
Fitchburg	2	—
Holyoke	1	—
Lawrence	1	—
Lynn	1	—
Marblehead	1	—
Marshfield	1	—
Medford	1	—
Quincy	1	—
Templeton	1	—
Waltham	1	—
Watertown	1	—
Weymouth	1	—
Winthrop	2	—
Worcester	6	—
Out of State	1	—

15 cases of *trichinosis*:

Belmont	1	—
Boston	4	—
Brockton	1	—
Burlington	1	—
Everett	1	—
Fall River	1	—
Lynn	1	—
Medford	1	—
Newton	1	—
Somerville	1	—
Watertown	2	—

612 cases of *tuberculosis hilum*:

Amherst	7	—
Arlington	2	—
Belmont	7	—
Boston	93	—
Boxborough	1	—
Boxford	1	—
Braintree	22	—
Bridgewater	16	—
Brockton	23	—
Brookline	1	—
Cambridge	15	—
Chelsea	5	—
Concord	1	—
Cummington	1	—
Dartmouth	11	—
Everett	2	—
Fairhaven	1	—
Fall River	16	—
Falmouth	6	—
Fitchburg	19	—
Framingham	2	—
Greenfield	12	—
Harwich	4	—
Haverhill	5	—
Hingham	1	—
Holden	1	—
Holyoke	3	—
Hudson	3	—
Lawrence	2	—
Leominster	3	—
Lexington	1	—
Lowell	3	—
Lynn	6	—
Malden	62	—
Marlborough	6	—
Marshfield	1	—
Medfield	1	—
Medford	14	—
Medway	1	—
Methuen	2	—
Middleborough	7	—
Milford	6	—
Monson	1	—
Natick	7	—
Needham	4	—
New Bedford	35	—
Newton	6	—
North Adams	1	—
Norwood	1	—
Pepperell	1	—
Pittsfield	4	—
Plymouth	17	—
Quincy	10	—

	Cases	Deaths		Cases	Deaths
Randolph . . . . .	5	-	2 cases of <i>typhus fever</i> :		
Reading . . . . .	1	-	Boston . . . . .	2	-
Revere . . . . .	4	-	15 cases of <i>undulant fever</i> :		
Rochester . . . . .	1	-	Amherst . . . . .	1	-
Salem . . . . .	1	-	Attleboro . . . . .	2	-
Seekonk . . . . .	2	-	Belchertown . . . . .	1	-
Sharon . . . . .	3	-	Brockton . . . . .	1	-
Somerville . . . . .	2	-	Canton . . . . .	1	-
Southbridge . . . . .	1	-	Greenfield . . . . .	1	-
Springfield . . . . .	13	-	Haverhill . . . . .	1	-
Stoughton . . . . .	1	-	Montague . . . . .	1	-
Sunderland . . . . .	2	-	Northborough . . . . .	1	-
Waltham . . . . .	20	-	Pittsfield . . . . .	1	-
Wareham . . . . .	16	-	Stoughton . . . . .	1	-
Watertown . . . . .	27	-	Sutton . . . . .	1	-
Westborough . . . . .	3	-	Wilmington . . . . .	1	-
Westhampton . . . . .	2	-	Winchendon . . . . .	1	-
Westport . . . . .	2	-	*Imported cases.		
Whitman . . . . .	8	-			
Wilbraham . . . . .	3	-			
Williamsburg . . . . .	6	-			
Woburn . . . . .	1	-			
Wrentham . . . . .	5	-			

## MASSACHUSETTS STATISTICS FOR 1932

Population (Estimated as of July 1, 1932) . . . . .	4,297,050
Death rate per 1,000 population . . . . .	11.5
Infant mortality (per 1,000 live births) . . . . .	53.1

## REPORT OF DIVISION OF FOOD AND DRUGS

HERMANN C. LYTGOE, *Director*

The Food and Drug Division during the year 1932 has been engaged in the usual activities relative to the enforcement of the laws pertaining to the sale of milk, foods, and drugs; the slaughtering laws; the cold storage laws; the bakery law; the mattress law; the pasteurization establishment law; as well as in the examination of liquor and chemical samples presented by police departments.

This year completes the fiftieth year of continuous food and drug inspection on the part of the Department. During the early years of the work, the only laws which were enforced were those relating to milk and to the adulteration of foods and drugs. From time to time additional laws have put additional work upon the Department.

During this period market conditions relating to milk, foods, and drugs have changed materially. During the first few years of enforcement it was found, for example, that fully 90 per cent of the market spices were adulterated. To a less extent, adulteration was very prevalent in honey, molasses, maple syrup, cream of tartar, and coffee.

At the time the United States Food Law went into effect, in 1906, the Massachusetts market was, for practical purposes, free from adulterated food of the above character, and at present very few samples of these types of food are collected because they are invariably pure.

During the year 1932, somewhat more samples were collected and examined than during 1931, notwithstanding the fact that the number of liquor samples decreased by 20 per cent. There were 17,419 samples examined during 1932, and 17,373 samples examined during 1931. There were increases in the samples of milk and food collected. The number of drug samples was somewhat less than in 1931, and the number of liquor samples decreased from 6,012 to 4,810. Notwithstanding the financial depression, the results of the examination showed an improvement in the quality of milk, foods, and drugs sold, with a consequent decrease in adulteration and also a decrease in the number of prosecutions. There were 249 prosecutions as compared with 324 in 1931.

The reports show a reduction in prosecutions for the sale of low standard and adulterated milk, for the sale of adulterated meats and meat products, decomposed food, cold storage eggs, false advertising, and a slight increase in prosecutions for violation of the pasteurization law, and for the sale of adulterated drugs.

Of the 249 cases prosecuted, 224 resulted in conviction; 4 were placed on probation or filed without finding; 4 were dismissed for want of prosecution; and 17 resulted in finding of not guilty. The results of the prosecutions will be found in Table 1.

A year ago, we thought that we had reached the millennium as the result of examinations of milk samples collected. This year, however, the dairy industry has beaten last year's record, notwithstanding the fact that we have collected and examined more samples of milk. In 1931 we made 5,065 chemical examinations, and in 1932 we made 5,501 such examinations. In 1931 there were 48 samples containing added water, and in 1932 only 45. In 1931, 73 samples showed evidence of removal of cream, and in 1932, 74 such samples, the percentage of cream-removed samples being lower than in 1931. Comparing the 1932 figures with those of 1931, they show a 10 per cent increase in the number of samples; a 15 per cent reduction in the number of low standard samples; a 14 per cent reduction in the per cent of watered samples; and a 7 per cent reduction in the per cent of samples from which cream had been removed. One would naturally expect from these figures that there would be an improvement in the composition of the average milk. In 1931, the average sample collected contained 12.40 per cent solids and 3.76 per cent fat. In 1932, the average sample contained 12.51 per cent solids and 3.89 per cent fat. The standard is 12 per cent solids and 3.35 per cent fat. It is therefore very evident that the dairy industry is giving the Massachusetts public an exceptionally high quality of milk. The usual summary of milk statistics will be found in Tables 2 and 3.



## BACTERIOLOGICAL EXAMINATIONS OF MILK

During the past year, there were examined bacteriologically, 4,438 samples, which is 800 more than were examined in 1931. Of these samples, 4,081 complied with the regulations, representing 91.93 per cent of the total samples collected. In addition to these samples, examinations were made relative to the efficiency of certain pasteurization plants when samples were taken during the entire process at five-minute intervals. The analyses reported above contain only those of the unpasteurized samples and the completely pasteurized samples. Of the 134 samples of certified milk examined, only one did not conform with the bacteriological requirements.

During the course of the year, a number of collections were made of milk sold to the public in pint bottles, the entire bottle being brought to the laboratory for examination. Included in these were 214 such samples representing raw milk sold as such. The lowest count was 300; the highest count was 1,100,000. Two hundred and one samples had counts below 300,000 and 13 samples had counts above this figure. The geometric mean was 26,626, which is unusually low for this type of milk. Only a short time ago the top limit of 500,000 placed by many boards of health on this type of milk was considered altogether too high.

The largest number of samples collected represented milk going to the pasteurization plants to be pasteurized. There were 3,014 such samples. The lowest count was less than 1,000, the highest count was 8,900,000 and the geometric mean was 59,371, which is less than the geometric mean of similar samples collected in 1931. One thousand, three hundred and eighty-seven of these samples had counts below 50,000; 2,386 of these samples had counts below 250,000, which is the maximum count set for Grade A milk prior to pasteurization; and only 187 samples had counts above the 750,000 limit set by this Department for such milk.

When the operator of a pasteurization plant is informed as to the quality of the milk which he is pasteurizing, he invariably takes means to see that conditions are improved. The average man in this business apparently wishes to have the product he is selling in accordance with the requirements. Occasionally, these reports of high counts are sent to the local board of health when such board maintains a laboratory for the bacteriological examination of milk. The high bacteria counts in this type of milk have been reduced by this means without taking the matter before the courts, although bacteriological evidence of high counts has been introduced in court cases where the operator of the pasteurizing plant has been accused of operating under unsanitary conditions.

There were 96 samples of Grade A milk collected. The lowest count was less than 10; the highest count was 640,000. Eighty samples were below 25,000 and 16 samples were above this figure. The second set of samples obtained from dealers putting out Grade A milk with a high count, in each instance was found to comply with the regulations.

There were 622 samples of pasteurized milk collected, some of which were obtained at the time of delivery to the consumer. The lowest count was less than 10; the highest count was 890,000. Five hundred and twenty of these samples had counts below 50,000 and 102 had counts above this figure. The geometric mean, exclusive of pasteurized certified milk and Grade A milk, was 10,840. Dealers from whom high-count pasteurized samples were obtained were given hearings in many instances and then were advised to find out where the trouble lay, and generally they found out as determined by subsequent samples. Frequently, such persons called at the office after the hearing and brought evidence to show that the conditions causing the high bacteria count had been determined and corrected.

There were a number of samples examined for hemolytic bacteria. Many of these samples represented milk obtained from individual cows where there was suspicion of septic sore throat infection. Whenever the cow causing the trouble was identified, the owner of the cow was informed that the cow was a diseased cow and the law provided a penalty for the sale of milk from such cow. The owner in each case then said that he would have the cow killed. He was informed that it would be quite proper to have the cow killed at a slaughterhouse and that the meat would probably pass for food purposes because the sickness was merely a local lesion in the udder, and, while it affected the milk, it would not affect the meat. In

each of these instances, an inspector of the Department has seen the animal killed.

A complaint was received relative to the presence of hemolytic bacteria in certain market milk, and it was found in such milk. The strains first obtained from this milk were killed by pasteurization, although the bacteriologists of the plants claimed that they obtained strains which were not killed by pasteurization. From subsequent samples, certain strains were obtained which survived heating at the pasteurization temperature of 140° for thirty minutes under well-controlled laboratory conditions. It is very evident that some of the hemolytic types of bacteria are not pathogenic.

In the order of increasing bacterial count, the geometric means were approximately as follows:

Pasteurized, certified milk	55
Certified milk	2,000
Pasteurized milk	11,000
Raw milk sold as such	27,000
Raw milk intended to be pasteurized	59,000

There probably is no other state in the Union where such a high quality of milk is sold.

Table 4 gives a summary of the bacteriological examinations of milk.

#### CERTIFIED MILK

There are now six farms producing certified milk for sale in Massachusetts. These are as follows: Walker-Gordon Farm, Needham; H. P. Hood and Sons, Inc. Cherry Hill Farm, Beverly; Alta Crest Farm, Spencer; Quonquot Farm, Whately; Fillmore Farm, Bennington, Vermont; Hampshire Hills Farm, Wilton, New Hampshire.

All of these farms, except the Fillmore Farm, have been visited at least once during the year and conditions have been found to be satisfactory.

The Boston Medical Milk Commission collects samples each month from each of the farms certified by that Commission and these samples are submitted to the Department for analysis. This furnishes the Department with milk from all the farms except two. Inspectors of the Department have obtained samples from the Quonquot Farm which supplies Springfield and vicinity, but no samples have been obtained from the Fillmore Farm which sells only a few quarts per day in Pittsfield.

There were, in all, 148 samples examined, of which eighty-three were certified milk and 65 were certified and pasteurized milk. Chemical examinations were made on all of these samples, and in addition, bacteriological examinations were made on 75 samples of certified milk and 59 samples of certified and pasteurized milk. There were two low standard samples, low both in solids and fat, and obtained from the same farm. There was also obtained from this same farm, a sample labeled "fat-free milk" with the skimmed milk tag attached, but the sample was misbranded because the fat content was 3.65 per cent, which is far from being fat-free.

The lowest total solids was 11.68 per cent; the highest was 14.94 per cent; the average was 13.03 per cent. Fifty per cent of these samples had solids between 12.76 per cent and 13.38 per cent. The lowest fat was 3.25 per cent; the highest fat was 5.25 per cent; the average fat was 4.16 per cent. Fifty per cent of the samples had a fat content between 3.91 per cent and 4.31 per cent. The solids exclusive of fat varied between 8.03 per cent and 9.08 per cent with an average of 8.93 per cent. Fifty per cent of the samples were between 8.70 per cent and 9.06 per cent. It is very evident from these figures that these herds contain a considerable number of yellow cows.

Milk from one farm, although above the legal standard, was found to be running below the 4 per cent fat required by the regulations of the American Association of Medical Milk Commissions. The Commission certifying this farm was informed and a reply was received that the Commission had not obtained samples running below 4 per cent fat. Three more such samples were collected with about the same result and this information was sent to the Commission. A subsequent

visit to the farm showed that there had been added to the herd quite a few yellow cows and a sample obtained from the refrigerator at that time was found to have a fat content of 4 per cent.

Of the 75 samples of certified milk, only one had a count above 10,000 and the highest count of the other samples was 8,200. This 13,000 count came from the first sample collected during the year from the dairy in question. Subsequent samples showed lower counts; one of 7,400, four between 2,600 and 3,500, and two below 1,000, with the lowest count 600.

The geometric mean of all the counts of the certified milk was 2,023, which is not far below the arithmetic average of 2,837. This closeness between the arithmetic and geometric average indicates a relatively low number of high count samples.

There is, apparently, an increasing demand for pasteurized certified milk and all the certified farms except one are equipped to furnish such material.

Of the 59 samples of pasteurized certified milk examined bacteriologically, the lowest count was 3, the highest count was 3,300, and the geometric mean was 55. There were 51 samples with a count less than 100 and only 8 samples with a count above 100. Seven of these 8 samples came from one farm. In this respect, it is only fair to state that the geometric mean of the certified milk not pasteurized produced by that farm was somewhat below that of the milk produced on the other farms.

During the year, there has been produced on many of these farms, a Vitamin D milk which is sold either raw or pasteurized. This is produced by feeding yeast which has been irradiated with ultra-violet light. After the cows have been fed with this material for a few weeks, the Vitamin D will appear in the milk. The Department has made no vitamin assays on this milk. Information received from the physicians prescribing this milk convinces us that the Vitamin D is present. The process is controlled by patents and before the dairy is permitted to sell the product as Vitamin D milk an assay is made. It is very probable that this type of treatment will find its way into milk other than certified.

#### PASTEURIZATION PLANTS

Shortly before the beginning of the year, an additional inspector was appointed to assist in the inspection of pasteurization establishments. As a result of this appointment, more work has been done this year than during the previous year.

There were 640 pasteurization establishments in the State in May, 1931. There were 611 such establishments in the State on November 30, 1932. Many of these plants which closed went out of existence by the financial route and others because they were not capable of grasping the distinction between clean and dirty handling of milk.

Because of local regulations requiring milk to be pasteurized or cows tested for tuberculosis, many persons pasteurize their milk in preference to having their cows tested. These persons were, in many instances, not sufficiently skilled in the mechanics of operating such establishments. They did not properly clean the pasteurizing apparatus, which resulted in the rapid deterioration of the pasteurizing vats and attachments. In many instances, the owner would permit boys to do the pasteurizing and clean the apparatus while he was engaged in distributing milk or dealing with his customers.

There were 910 inspections of pasteurization plants in 1932 as compared with 839 such inspections in 1931. These figures do not include those visits to pasteurization establishments for the purpose of taking samples to ascertain the efficiency of the pasteurization process or for taking samples to ascertain the quality of the milk received from the producers.

There were found to be 115 plants where conditions were considered unsanitary as compared with 111 in 1931. This increase is due in part to a stricter inspection during the present year. The regulations require the vat to be either equipped with leak-escape valves or to be disconnected from the influent or effluent piping during the pasteurization period. The purpose of this regulation is to prevent raw milk from getting into the pasteurizer during the holding and emptying period and to prevent incompletely pasteurized milk from getting into the pipe line during the



filling and holding period. There were 85 instances of violation of this regulation, some of which violations occurred upon establishments where the management was not responsible. We found several instances where the valve leaked and the man having charge of the work, instead of taking out the valve and regrinding it, merely put a plug in the leak-escape so that the management would not criticize him for the waste of milk which otherwise would come out of the leak-escape feature of the valve.

There were 84 instances where the recording thermometer charts did not bear the comparative readings of the mercury thermometer and the recording thermometer. There were 97 such instances in 1931. This regulation serves two purposes: first, it provides the operator of the plant with evidence as to the correctness of his pasteurization which he can use if perchance a suit is brought against him for alleged sickness among his customers, and, second, it provides the inspector with an indication of the correctness of the pasteurization work. Unfortunately, we find a great many of these notations on the chart are made without reference to the temperature record of the two thermometers. We frequently find that the record shows that the recording thermometer reads  $143^{\circ}$  and the indicating thermometer reads  $143^{\circ}$  and the record made by the recording thermometer shows a maximum of  $141^{\circ}$ . The dates are frequently put on the thermometer charts by the same method and there were 23 plants where the thermometer chart showed no dates.

There was a change in the pasteurization law, which went into effect during July. This change raised the minimum temperature of pasteurization from  $140^{\circ}$  to  $142^{\circ}$  and struck out the maximum of  $145^{\circ}$ , so that at present the statutory definition is "milk which has been raised to a temperature of not less than  $142^{\circ}$  for a period of not less than 30 minutes." Every pasteurization establishment of which we have a record, as per information of licenses granted by local boards of health, was sent a letter and a copy of this law. It is astonishing how many proprietors of pasteurization plants who persisted in operating at the former low temperature of  $140^{\circ}$  claimed not to have received this letter. We have found an increase in violation of this law; 113 cases in 1932 as compared with 58 cases in 1931. This violation has been noticed more than usual since the change in the law. This is, to a large extent, due to an obsession on the part of the milk dealer that pasteurization at the statutory temperature will destroy the so-called cream line. If the milk is held for 30 minutes at temperatures above  $147^{\circ}$ , the volume of cream will be less than if the milk is held at a lower temperature, although the percentage of fat will be the same. Milk dealers frequently obtain new customers upon the depth of the cream line of the sample which they submit. The customer does not realize that the cream line is no measure of the fat content of the milk and because of this some operators have apparently preferred to violate the law until they were caught and then claimed that they had received no notice of the change in the statute. Quite a number of the operators will take particular care that the temperature of the milk does not exceed  $142^{\circ}$  which will result in a reduction of temperature slightly below  $142^{\circ}$  in about 15 minutes, the difference in temperature being rather too small to warrant prosecution. Eventually, these persons have pasteurized or will at some time pasteurize a batch of milk where the temperature will drop below  $141^{\circ}$ , and then they will have a chance to call upon the judge.

The recording thermometers were found to be out of order in a number of instances. Whenever an inspector of this Department ascertained that fact, he informed the man that unless a new thermometer was installed in 36 hours, the matter would be referred to the courts and in each such instance the new thermometer was installed. In one case, the operator of the plant said that the thermometer had just come back from the repair shop and was out of order and had been sent back. The proprietor was unable to state exactly when the thermometer went out of order. He was asked to produce his recording thermometer charts and could not find any for the six months prior to our visit. He then said that the local inspector of the city where the milk was sold was aware of these conditions. We next visited the dairy instrument supply house and we ascertained that the proprietor of the plant had got in touch with them over the telephone. The inspector made a visit to the plant the next day and a new thermometer was installed.

There were 21 establishments which either had no license or else could not find it.

Notwithstanding the numerous violations which we found during the course of the year, there has, on the whole, been a decided improvement in the condition of the plants since the law went into effect. The operators of pasteurization plants are well aware of the unethical, reprehensible but perfectly legal actions taken by their competitors if they are brought before the courts. The competitors will obtain a certified copy of the court record and will visit all the customers of the person convicted and endeavor to get the business away from them, and, unfortunately, they frequently succeed. As an example of this practice, I would cite an incident of a man who called during the early part of November, 1932, bringing with him a copy of the annual report of this Department for 1931. He said he was taking milk from a certain dealer, who, according to the report, was before the courts for the sale of low standard milk. He also said he received this information from a milk dealer who desired to sell him milk and was endeavoring to induce him to change. In this case, I informed the man that the plant at which the milk dealer who desired his trade had his milk pasteurized was convicted in July last because of unsanitary conditions at the plant and was fined \$50.00. I also informed the man that since these two cases had been before the courts, both of the persons had been behaving themselves.

These pasteurization plants are located in 165 cities and towns. There were 15 localities where no inspections were made during the year. Two of these localities were cities with efficient local inspection and the plants had been inspected during the latter part of 1930, and will be inspected again during the early part of 1933. All but 56 plants were inspected during the year. In 77 localities, inspections were made but once; in 61 localities, inspections were made twice; and in 12 localities, inspections were made three times.

#### FOODS OTHER THAN MILK

There were collected and examined 2,123 samples of foods other than milk, of which 342 were either adulterated or misbranded. These samples consisted of 144 samples of eggs, 92 samples of Hamburg steak and sausages, 56 samples of low standard vinegar, 23 samples of butter deficient in fat, and a few samples of bakery products, breakfast foods, condimental sauces, cream, dates, figs, diabetic flour, maple syrup, mayonnaise, and pickles.

The butter samples were obtained during the early part of the year, and practically all of these samples represented material obtained in interstate commerce. One set of samples, representing an interstate shipment, was intercepted, and the representative of the creamery came a distance of about a thousand miles to the hearing. The gentleman was informed that there was sufficient evidence to warrant proceeding in the United States courts, and unless the shipment of low standard butter ceased immediately, the case would be prosecuted. The low standard shipments ceased. There was no low standard butter obtained after the first of February until October and November, when a few more samples were obtained, two of which resulted in prosecution in the Massachusetts courts. On the whole, butter conditions were fairly satisfactory.

The single sample of adulterated candy was a sample of chocolate peanut bar, which was wormy. The two samples of adulterated bakery products consisted of mouldy bread. The sample of condimental sauce was misbranded horse radish, which consisted of a mixture of horse radish and beets. The samples of cream reported as misbranded were sold without being graded as required by statute. The other 15 samples contained more fat than required by the grade. Two samples of dates and figs were found to be wormy. The nine adulterated samples of maple syrup were syrup served in restaurants and were represented on the menu as being maple syrup, and in fact were cane sugar flavored in imitation of maple syrup. The sample of mayonnaise reported as adulterated was made with mineral oil and was not made with food oil. The person putting out the material was informed that such material should be sold as a drug and not as a food. The sample of pickles reported as adulterated was a sample of mixed pickles having a peculiar taste and odor. Examination showed that the pickles had undergone protein decomposition.

During the year, 570 samples of eggs were collected, of which 144 were either misbranded or adulterated or were falsely represented. In many instances cold



storage eggs were sold as fresh eggs or Western eggs and were so sold without bearing the "Cold Storage" labels required by law. In many instances the violator was the retailer, and in a few instances it was the wholesaler. It is at times very difficult to get the necessary evidence to warrant proceeding in these cases. We were, however, able to obtain evidence against several of the large wholesale dealers in eggs. In one instance, the inspector obtained a dozen eggs from a store, and upon looking over the case he found attached to the case a label bearing certain hieroglyphics which the inspector could decipher. These were statements as to the entry date of the eggs into storage and the date of removal from storage. The storekeeper did not understand what they were. This resulted in a conviction and penalty upon the wholesaler. In another instance, the representative of the wholesale house stated at the hearing that the eggs which were sold as "Fresh Western Eggs" were eggs which had been held in storage for thirty days or less. This case resulted in a conviction.

There were quite a number of instances of the presence of decomposed eggs, and the bulk of these cases resulted in prosecution and conviction. One case, where the Lower Court imposed a fine of \$100.00, was acquitted in the Superior Court, the case being tried before a justice without jury. In this case the judge held that it was necessary to find more than one decomposed egg. The law, however, seems to be particularly broad to include any part of an egg, and in all other instances where this point has been raised, the case has resulted in conviction.

There were 265 samples of Hamburg steak collected and 686 samples of sausages. Of these, 56 samples of the Hamburg steak contained sulphite preservatives and the package was sold without the label required by the regulations. Thirty-six samples of sausages either contained sulphites or contained excess cereal or contained coloring matter.

Experimental work has been carried on in the laboratory relative to what action sulphite has upon meat. There is apparently some change in the meat itself as shown by the peculiarities of the titration for the presence of amino acids. The figures do not correspond to what one would expect after taking into consideration the alkalinity of the sodium sulphite. The sodium sulphite at low temperatures has some preservative action, but at higher temperatures this action is not quite so marked.

During the latter part of the year, bacteriological examinations were also made on Hamburg steak. Ten samples of commercial Hamburg steak containing sodium sulphite had bacterial counts ranging from 25,000 up to 8,600,000 colonies per gram, with an arithmetic average of 2,007,300 and a geometric average of 386,280. Seven such samples of commercial Hamburg steak not containing sodium sulphite had bacterial counts varying from 5,500 up to 2,000,000 colonies per gram, with an arithmetic average of 444,357 and a geometric average of 96,095. These figures indicate that the sulphite is not a particularly good preservative; or that the persons using sulphite do not take proper care of the mixture and depend upon the preservative instead of the ice chest to keep the meat from spoiling; or they handle the meat under decidedly unsanitary conditions.

There have been a number of instances which have resulted in prosecution for the sale of decomposed Hamburg steak containing sulphite preservatives. In many instances this material is prepared by dissolving the preservative in water, placing the cut up meat in the water, which will then be absorbed by the meat. The next morning the meat is run through the meat chopper and sold. Chemical examinations show in many instances excessive quantities of water in the meat at the time of sale.

There were 172 samples of vinegar collected, of which 56 were below the legal standard. Most of this vinegar was shipped into the State from Rhode Island. We were able, in some instances, to convict the person who brought this material into the State. The material was practically all transported by the trucks of the persons making the sale and was not shipped by common carrier. The vinegar business is carried on in such a manner that there are liable to be three or four people between the retail vendor and the manufacturer, it being rather unusual for a manufacturer of vinegar to ship directly to the retailer.

A summary of the food statistics will be found in Table 5.



## DRUGS

There were 291 samples of drugs examined, of which 81 were found to be adulterated or misbranded. During the year, the work of the prior year on argyrol was continued. There were 191 such samples collected, and 54 were found to be below the standard specified upon the label. There was some criticism of the Department by the trade for selecting this article for inspectional purposes on the ground that it was a proprietary article. It should, however, be understood that all the cases prosecuted were cases where the article fell materially below the strength specified on the label, whether the article was argyrol or whether it was a substitute for argyrol. At several of the hearings the druggists were asked if the customers ever called for silver nucleinate or whether the physician ever prescribed for this drug, and the reply was that it was very unusual and that the calls were nearly always for argyrol.

The inspectors asked for 15 per cent argyrol and the package was sold so labeled. The total solids content of these samples varied between 2.3 and 22.5 grams per 100 cubic centimeters: 80 per cent of the samples varied in total solids between 11.3 and 16.9 grams per 100 cubic centimeters; 50 per cent of the samples varied between 12.4 and 15.4 grams per 100 cubic centimeters.

The method of examination used was developed by Mr. Boyce during the course of the work. During the past six months this method has been as follows:

A 5 cubic centimeter pipette, carefully calibrated, was found to deliver 4.99 cubic centimeters. A milk bottle cap was punctured with a small hole through which the pipette could be passed. Five cubic centimeters of the alleged 15 per cent argyrol solution were measured into the weighing bottle covered by the paper cap and the pipette was allowed to drain for three minutes. The material so measured was weighed and was transferred to a porcelain dish with water. This was dried for ten hours at 110° and weighed. The results were expressed both as per cent by weight and as grams per 100 cubic centimeters. After weighing, the solids were dissolved in water and were transferred to a Kjeldahl flask, the last washing being with 5 cubic centimeters of concentrated nitric acid. The material in the flask was digested with concentrated sulphuric and nitric acids. Nitric acid was added to the material until the organic matter was apparently all consumed. The material was removed from the flask and was titrated with potassium sulphocyanate, using ferric alum as the indicator. A comparison of this method of determining the silver with the U. S. P. method showed that the U. S. P. method gave results which were slightly below those obtained by the acid digestion.

In the defence of a case involving the sale of low strength material, it was stated that during the process of evaporation as described above, there would be a loss of ammonia nitrogen from the argyrol and the results would therefore be low. The following experiment was therefore conducted upon a 10 per cent solution which had been exposed to light for some time in the laboratory.

About 5 grams of the solution were weighed and transferred to a clean and dry Erlenmeyer flask which had previously been weighed. This flask was then closed with a rubber stopper having two holes, one hole containing a tube leading from the top of the flask into a 250 cubic centimeter volumetric flask containing 50 cubic centimeters of water and 2 cubic centimeters of fifth normal hydrochloric acid. The other hole contained a tube descending somewhat further into the flask but above the liquid in the flask. This flask containing the tubes was placed in a beaker containing water which was brought to the boiling temperature and so maintained throughout the experiment. Ammonia free air was then forced through the flask and at the same time through a by-pass a portion of the air was forced into another 250 cubic centimeter flask containing an equal quantity of water and fifth normal hydrochloric acid. The rate of bubbling of the air through both flasks was maintained as nearly constant as possible. This drying process was continued for ten hours. The two flasks containing the hydrochloric solution were removed and the ammonia determined colorimetrically with Nessler solution. The blank showed no measurable quantity of ammonia against the standard solution used. The standard solution contained 0.0008 grams of ammonium sulphate per 250 cubic centimeters. The readings made by means of a Dubosque colorimeter showed that 0.00066 grams of ammonia were driven from the argyrol

during the drying process. The residue in the flask weighed 0.4742 grams. The loss in weight due to ammonia was approximately 0.14 per cent.

A similar experiment was carried on, using barium hydrate as the absorbent and carbon dioxide free air, resulting in no precipitate in the barium hydroxide solution, showing no oxidation of any of the organic matter to carbon dioxide.

Experiments upon the refractive indices of these solutions were made by Mr. Ferguson, who found that the total solids could be calculated from the refractive index.

After this work was completed, all the samples upon which prosecutions were made were analyzed both by determination of the refractive index and by actual determination of the total solids.

One sample of ether was examined and found not to conform to the requirements of the Pharmacopœia. A complaint about this was made by a local board of health. A physician stated bad results because of the use of this as an anæsthetic. An inspector called upon the physician and asked for the balance of the ether and also for the name of the drug store. The physician then very kindly called up the drug store and told them an inspector was coming, and when the inspector got there the proprietor of the drug store was entirely out of that particular lot of ether. The other samples obtained at the store were found to conform to the Pharmacopœia requirements.

The fourteen samples of silver nucleinate examined represented argyrol and various other material of this character. In all these instances the material was found to conform to the Pharmacopœia requirements as to the silver content.

A summary of the analyses of drug samples is found in Table 6.

The police departments submitted 4,810 samples of liquor and 105 samples of drugs, chemicals, and poisons. Summaries of these analyses are found in Tables 7 and 8.

#### BAKERIES AND SOFT DRINK FACTORIES

The inspection of bakeries was somewhat curtailed, partly owing to the fact that the bakeries in the State, because of continuous inspection over a number of years, are in fairly good sanitary condition, and also due to the fact that an intensive investigation was made of the soft drink manufacturing establishments early in the season and this was followed up later in the season in order to ascertain whether the defects had been corrected. The second inspection showed that the proprietors had complied with the suggestions of the inspectors or with the warning letters which were sent.

It was found in many instances that proprietors of these establishments were operating without licenses, and in these cases they were advised to either get a license or to close the establishment. To a slight extent this was true in connection with the spring water establishments, and in a few instances it was found that licenses had been granted to such establishments without first obtaining the approval of the Department as to the quality of the water obtained from the spring. In the cases relative to spring waters, immediate compliance was made with the suggestions as to changes and improvements, and to licenses, etc.

A summary of inspections of bakeries made by the Division will be found in Table 9.

#### SILVER POLISH

A few years ago it was found that potassium cyanide was to some extent used as a silver polish in hotels and restaurants. As a result of sickness in New York, the Massachusetts hotel and restaurant men agreed to discontinue the use of cyanide as a cleaning material for silver. In view of this, the Department agreed not to ask for any specific legislation upon the subject.

During the latter part of the year, the fourth annual check-up among the Massachusetts dining places was made. Establishments visited were located in Boston, Lynn, Cambridge, Salem, Worcester, and Springfield. This check-up disclosed that the restaurant and hotel men are living up to their agreement and they are not using cyanide as a silver polish. The inspector reported that the hotel and restaurant managers seemed to be taking special precaution against any polishes or solutions containing poisonous ingredients. The management in each place visited furnished all the information desired by the inspector and seemed willing



in every way to protect the public in the care of its silverware. A few samples of silver polish of unknown nature were obtained during this check-up and these polishes were found to be free from cyanide.

### BEDDING LAW ENFORCEMENT

Among the Department activities for the past ten years has been the enforcement of the bedding and upholstered furniture law (now found in chapter 94, sections 270-277), which has been included in the work of the Food and Drug Division.

Following complaints pertaining principally to bedding, the Division began its active work during 1922 by a State-wide survey of the bedding industry. The Department, feeling its power limited by the wording of the statute, requested an opinion from Attorney General J. Weston Allen, who gave a ruling that the Department could with propriety prosecute the work under this act. The law at no time carried any special appropriation for the work entailed, which consisted of giving attention to about fifty mattress plants scattered in cities throughout the Commonwealth. The force of inspectors being limited, one inspector was assigned to make a general survey of the plants and any bedding stores which might be found not operating in accordance with the legal requirements.

The State Board of Health, in 1886, through Dr. Charles F. Withington, conducted an investigation into domestic and foreign rags being handled in this State. If any rags were finding their way into bedding at that time, as was subsequently found, the investigators did not reveal. It was apparent that dirty, diseased rags were then held responsible for some outbreaks of contagious diseases among the handlers in rag-sorting establishments.

The bedding law was framed principally to regulate the industry against the use of old bedding from hospitals or from persons who suffered from contagious or infectious diseases. This material was also subsequently barred from upholstered furniture. The law was also aimed to discourage the use of secondhand material because its sponsors felt that most secondhand material was inimical to the health of a child or adult who might seek rest or repose on bedding containing such material.

A tag was required on each article of bedding or upholstered furniture to state truthfully in the English language the name of the material used for filling. Secondhand material is not prohibited but must now be named on a red tag. Such a rigid requirement certainly did not meet with the approval of the makers of cheaper bedding.

The original law of 1915 was found weak and ineffective in many respects, and in 1919 the Department found it necessary to strengthen the statute with amendments against secondhand material and giving authority to inspectors to open mattresses found on sale, which might be suspected as being detrimental to health. The law did not permit action against the firms engaged in removing the stuffing of old discarded mattresses and baling this material, since it was known that some of this filling might be used for purposes other than the manufacture of mattresses. It did, however, require a person so engaged to mark bales and other receptacles with the word "secondhand." While there occurred mislabeling of mattresses by using trade names instead of calling the filling material correctly, the main violation against the bedding law has been the use of secondhand material.

The association of mattress firms was ostensibly favorable toward discriminate legislation striking at the use of renovated material under the guise of "new." There were also among the personnel a large number of firms who viewed the advantages from the commercial angle, and, while outwardly for cleanup legislation, were later convicted for illegal use of secondhand material.

The boom business years of 1923 to 1929 saw increased demands for mattresses and high prices for manufacturer's stock. New cotton, hair, kapok, and like fillings reached a point of cost which caused the smaller in the trade to seek substitutes and camouflaged secondhand material then offered a tempting solution to many who could see a neat profit in this new departure.

Buyers insisted on purchasing only the cheapest bedding and were equally insistent that "New Material" tags be attached, so it was squarely up to the manufacturer to find "New Material" and sell cheap, this bringing recourse to second-



hand material. Competition was keen and the bedding buyers of the stores asked the mattress maker to assume all risk. In the above manner the high powered sale factors of the retail trade put plenty of pressure on the manufacturers struggling for all this special business.

With prices high for new cotton, kapok, etc., there appeared on the market in profuse quantities, ground-up cloth shredded by pickers operating 600 revolutions a minute. This material, mostly derived from dirty rags and used clothing, was sold as "Wool and Cotton Napper" at an attractive figure. The shredding destroyed the original appearance of the goods and it was thus impossible to prove this filling to be contraband secondhand material to the satisfaction of any court.

Attempts were made to convict firms using this material and labeling it "new", but such efforts were mostly futile. Furniture and bedding firms selling at retail, who were "offering for sale" mislabeled bedding, assumed a sanctimonious air and threw themselves upon the mercy of the courts, pleading ignorance. Under such circumstances it was most difficult to convict some deliberate offenders. Inspectors could not prove that each specific pound of secondhand filling came from used clothing and old rags. On the other hand, the wholesalers of these goods testified that all such napper as sold was 100 per cent new. High priced lawyers did the rest. Courts were confused and could not do justice for the public, much as they desired, so many escaped penalties.

The law was changed in 1928, defining the words "previously used", "previously been used", or "been used before" as "any material which has been used as a part or portion of another manufactured article or used for any other purpose."

A firm in 1929 was found guilty for using "napper" or shredded material and marking the same as "new." After appealing to the Superior Court, the defendants resolved to test the new law. On an agreed statement of facts the case went to the Massachusetts Supreme Court which ruled that even though clips from a roll or bolt of new cloth never used before are shredded, they then become secondhand material, and if used for mattress filling, must be marked "Secondhand". The decision was of the utmost importance and a death blow to secondhand material.

The bedding industry throughout the country saw its far reaching effects. Legitimate dealers in new cotton and cotton wastes hailed the finding with delight. Unhealthful, diseased material could no longer be used for sleeping purposes as a mattress filling unless made known to the buyer.

In order to place a further barrier against this material, at the request of the industry, the Health Council required a red tag marked "Secondhand" when secondhand material is used in a mattress.

Needless to say, violations of the law in this industry have been reduced to a minimum, the Supreme Court ruling aiding most materially in bringing about this end. Like the seller of diseased meat, watered milk, and adulterated food, the vendors of illegal bedding have found the depression of unusual weight. Their means for exploitation of their nefarious goods met an impasse from the courts and all now find their fields for further work narrowly circumscribed by the inner spring mattress. Instead of a vegetable fiber, coil springs are now being used for "filling." It is said that the demand for this type of mattress is steadily growing.

A list of mattress violations prosecuted in the Courts of the Commonwealth and the years, is as follows:—

Year	Cases	Year	Cases
1922 . . . .	25	1928 . . . .	8
1923 . . . .	17	1929 . . . .	4
1924 . . . .	7	1930 . . . .	8
1925 . . . .	2	1931 . . . .	7
1927 . . . .	1	1932 . . . .	3

During this period, thirty-five firms manufacturing bedding were hailed before the court. One Boston manufacturer who had repeatedly taken chances in evading the law, mostly in a minor way, was warned to stop being careless. When the violations continued, it became necessary to summons this offender to court. Although the offense was of a minor nature, the manufacturer evidently had

visions of prison bars, etc., and to obviate such dire consequences he secured the services of a widely known criminal lawyer. The attorney lost no time in pleading *nolo contendere* and paying a fine of \$10. Under the circumstances, the lawyer's retainer would have been sufficient penalty.

Another manufacturer was found using trade names on the label of his cotton mattresses and was asked to answer the charge. When the case came to court he asked the inspector prosecuting the case to dismiss the charge. He assured the inspector the district attorney would not prosecute the case if it went that far. It did. He was fined \$25, appealed, and the matter fell into the hands of the district attorney. After fourteen months the case still on the docket was called in Superior Court. The district attorney appeared willing to have the inspector who was chief government witness recommend to the court the filing of the case. In face of an eloquent plea by counsel for the defendant, he was assessed the lower court fine and \$15 more to pay the expenses to the county incurred by his appeal.

Two men in partnership in mattress manufacturing conceived the idea of obtaining their supply of "new white cotton" from a Springfield junk dealer. Needless to say, the material was not even white, but a conglomerate mass of fillings from hundreds of old mattresses. When caught, the men admitted their guilt and promised to cease such practices if allowed to go along without court action. When the cases were brought to court, they pleaded guilty and through counsel asked for a light fine in view of the fact that there was no previous court record. They were fined \$50 and the junk dealer had to stop buying old mattresses for want of a market.

One mattress firm caused considerable commotion in the trade by using second-hand kapok or silk floss and disposing of mattresses at a very low price. This firm was able to buy thousands of life preservers which had been manufactured for use of United States troops on transports during the war. The life preservers were filled with new Java kapok of very fine quality, this material having a much greater buoyancy than cork. Since the life saving equipment had never been used, the kapok was transferred to mattresses with little fear by the firm. The material being unused, it was impossible to distinguish it as secondhand. To prosecute, it would have been necessary to find the contents of the preservers being transferred to mattresses. While the kapok was secondhand, the task was no easy one to prove to stop the practice.

Like the polluted clams from out of State, some of the bedding from nearby states frequently involved gullible Bay State buyers. One Rhode Island manufacturer was sufficiently high powered in salesmanship to unload a large quantity of his product to Fall River and New Bedford furniture stores. All mattresses were allegedly of wool and marked "New Material." A Fall River law-abiding member of the craft complained to this department of the influx of mislabeled bedding. An investigation showed the material to be of the rankest sort. The owner of the factory refused to come into the Fall River court and answer to a criminal charge and escaped prosecution by remaining out of the State. Three furniture dealers who were vending the unclean material were prosecuted and their cases were filed.

When the last changes were made in the bedding law, one amendment which was expected by the manufacturers to be annexed to the bill failed in committee. This amendment pertained to the adoption of affixing adhesive stamps to the label of each mattress, pillow, cushion, etc. Such a system is in vogue in other states and its acceptance as part of the Massachusetts law would have been agreeable to many in the trade here. If passed, the amendment would require a small gummed stamp to be printed and sold to manufacturers of bedding and upholstered furniture at the cost of one cent each. Such stamp would be placed on the label of each article manufactured. The trade proposed that the revenue be expended in meeting the expenses of inspection work under the bedding laws.

It was not deemed advisable to have the State selling stamps and each manufacturer contributing to have inspectors watch him for possible violations of the law. Such a stamp affixed to each label might have its function wholly misinterpreted by the buyer of the article in that many might buy with a certain sense of security, feeling that the affixed stamp was a State seal of guarantee as to the purity of the contents.

Many of the trade are still anxious to see the adhesive stamp adopted.

The bulk of this work connected with the bedding industry has been carried on by Dr. Drury, one of the Veterinary Inspectors. During the last part of the year, Dr. Drury was assigned to make a survey of the industry, and he reported as follows:

"Plants were inspected in Boston, Lynn, Lowell, Beverly, Lawrence, New Bedford, Fall River, Framingham, Worcester, Springfield, Pittsfield, and Chelsea. The inner spring type of mattress is mostly in demand, this lessening to a large extent the use of cotton, kapok, and hair fillings.

In the manufacture of the inner spring, burlap is being used on most of the spring units, and at nearly all factories visited, new burlap was being used. At two small Worcester factories secondhand burlap was found, but as there were no finished mattresses, it could not be definitely determined whether these mattresses were to be labeled with white or red tags. Managers at both plants said the red label, denoting secondhand material, would be placed upon the mattresses.

Many large plants use little or no secondhand filling, while the smaller plants, making cheap mattresses, use the napper or ground cloth filling, but are well supplied with red tags. Many mattresses were found with red labels. Furniture stores, which were also visited, showed tags bearing the red labels.

One Chelsea plant was found using a maroon tag with lettering that made reading most difficult. The inspector was assured that only a red tag with legible lettering would be used in the future.

Some of the red tags, it was noted, were not securely attached to the mattresses and might be removed with little effort. Owners and managers were admonished to securely attach these labels.

There was the usual amount of gossip in the trade about the other firms using secondhand material, but in no instance was your inspector given any definite information upon which an investigation might be started. Most of the rumors pertained to the use of secondhand cotton in the manufacture of felt. Close observance of feed boxes on garnetting machines showed that cotton linter and cotton fly were the materials mostly used and that rumors pertaining to secondhand material were groundless.

A Beverly firm is using considerable secondhand filling in mattresses which are shipped to Maine and other states. These mattresses bear the labels "For Interstate Shipment Only."

The victory of this Department in the case of Commonwealth vs. National Mattress Company, with a Supreme Court decision defining "secondhand material", and the subsequent requirement of the red label on all mattresses with secondhand filling, has resulted in a marked change in most of the plants. Owners or managers who in the past were not averse to taking a chance to beat their competitors by using secondhand material, are now found to be abiding by the law.

The low price of new material has left little incentive for traffic in secondhand material. This, together with the present difficulty in using secondhand material without possibility of court conviction, has resulted in the bedding plants being conducted in a better manner than they have in many years."

#### COLD STORAGE

Tables 10, 11, 12, and 13 show the quantity of foods placed in storage during the year and the quantity of foods on hand in storage on the first day of each month of the year.

The holdings of food in cold storage have on the whole been less than in former years.

Tables 14, 15, and 16 give a summary of the requests for extension of time in storage, and the number of lots of food ordered removed from storage, where no request for additional time was made at the end of the twelve calendar months.

The law limits storage to twelve calendar months, but permits extension of time by the Department. Persons placing food in storage do so with the intention of removing it prior to the expiration of twelve months. There are business conditions under which this cannot always be done, and the past year has been no exception. In many instances it is commercially impracticable to sell storage food and non-storage food upon the same market. This applies more particularly to



fish than to any other food. Certain cuts of meat are sometimes unsalable, due to a plentiful supply of fresh meat.

The number of requests for extension of time was somewhat less than the number of requests during 1931. In all instances where requests were granted, the food was in proper condition for further storage, and the explanation as to the reason for the request was reasonable. In a few instances requests for extension of time were refused. In these instances the articles were held not to be in proper shape for further storage. The number of lots ordered removed from storage, upon which no request for extension had been made, exceeded the 1931 figure by a very small amount.

It was necessary to make one prosecution for holding goods in cold storage for a period longer than twelve calendar months. The person so prosecuted had been sent several letters directing him to remove the material from storage, to which letters he made no response. After the prosecution, he removed the article from storage.

There are sixty-three licensed cold storage warehouses in Massachusetts. These warehouses have been inspected frequently during the course of the routine work and have been found to be operating in a sanitary manner.

In connection with the routine work, the inspectors were obliged to make a number of confiscations of articles of food. A summary of these will be found in Table 17.

#### SLAUGHTERING INSPECTION

Cities and towns, except Boston, are required annually to nominate one or more inspectors of slaughtering, and are required to appoint these inspectors after receiving the approval of the Department. There are approximately five hundred such nominations made during the month of March, most of which are renominations of the men holding office at that time.

The inspectors appointed by the local boards are required to send each month to the Department a report, stating the number of animals they have inspected and the number they have passed for food purposes, together with the number they have confiscated, and the reasons for such confiscations.

The experience of the veterinary inspectors of this Department engaged in this line of work shows that these inspectors so appointed are doing their work on the whole in a highly efficient manner notwithstanding the fact that many of them are not veterinarians, yet they are well qualified for the work because of years of training in the slaughtering business. Occasionally one of these inspectors will send to the Department for assistance in a case where he is not sure as to the proper disposition to be made of the carcass, and in such case the assistance is furnished.

The Department receives occasional reports as to improper inspection, and such reports are always investigated. If evidence of improper inspection is secured, the inspector is either prosecuted or he is removed from office, or both, as circumstances may warrant.

Two complaints relative to improper inspection deserve comment. A licensed butcher notified the Department that he could furnish three persons who would testify that the inspector stamped the carcass of a hog which he had not seen slaughtered. Two inspectors of the Department visited the complainant, and showed him the letter, which he acknowledged he wrote. He then produced a man who worked for him, who said that he had a sick hog which he was obliged to kill, and subsequently the inspector stamped the carcass, and he then sold the carcass to a store. He promised to give the Department the name of the store. This constituted a *prima facie* case against the inspector, but the inspectors of the Department called upon the inspector, and he denied that he had so violated the law. They then took him to the house of the person who said that he owned the hog. When they arrived at the house, the person declined to talk on advice of his mother. The inspector of this Department then informed him that he had furnished sufficient evidence to warrant prosecution for killing in the absence of the inspector a hog with the intention of selling the hog for food purposes. The young man then said that the proprietor of the slaughterhouse requested him to make this statement for the purpose of getting something on the inspector. Apparently, the butcher was of the opinion that the mere statement such as he furnished would be sufficient to cause the inspector's removal.

Several letters were then sent to the butcher, asking him to furnish the additional evidence he promised in his first letter, but no reply was received. The material, including copies of the correspondence and copies of the inspector's reports, was then sent to the local board of health for such action as the board saw fit to take. The matter was referred by the local authorities to the district attorney, who indicted both the proprietor of the slaughterhouse and the young man for conspiracy. In the Superior Court, the young man was placed on probation for a definite period; the proprietor of the slaughterhouse was convicted and fined; and a few weeks later the local authorities revoked his license.

In the other case, the Department received information from the Department of Conservation that one of the inspectors was passing carcasses without proper inspection. The information was received by that Department in good faith, and as a result, the U. S. Department of Agriculture declined to pay indemnity on carcasses of reacting animals if the inspector in question represented the Division of Animal Industry at the autopsy. Inspectors of this Department were sent to follow up all the evidence of misconduct which could be obtained. Every person, but one, mentioned in connection with the case was interviewed, and several attempts were made, without success, to interview the other person. The principal complainant in the case wrote a letter to this Department, stating that the man in question was qualified to do the inspectional work, and he was unable to produce any evidence of improper conduct on his part.

The attacked inspector requested of this Department a copy of this correspondence, and this copy, involving 68 pages, was sent him. He is still the inspector of slaughtering for the town in question, and the Department believes that his work always has been in accordance with the law.

Table 18 contains the summary of confiscations of carcasses by local slaughtering inspectors. A perusal of these statistics shows very conclusively that the inspection of carcasses intended for food, made by local slaughtering inspectors, is done in a very efficient manner.

TABLE 1. — *For Sale of Milk not of Good Standard Quality*

NAME	ADDRESS	COURT	DATE	RESULT
Alevakis, James . . . .	Athol . . . . .	Athol . . . . .	Aug. 15, 1932	Conviction
Dumouselas, Peter . . .	Framingham . . . .	Framingham . . . .	July 25, 1932	Conviction
Dwinnell, John W. . . .	Topsfield . . . . .	Peabody . . . . .	Sept. 28, 1932	Dismissed
Equi, Louis . . . . .	Millers Falls . . . .	Turners Falls . . . .	Aug. 16, 1932	Conviction
Fallon, Ethel . . . . .	Hingham . . . . .	Hingham . . . . .	Sept. 7, 1932	Conviction
Georgian, John . . . . .	Cambridge . . . . .	Cambridge . . . . .	June 2, 1932	Conviction
Gomes, Frank . . . . .	Quincy . . . . .	Quincy . . . . .	July 27, 1932	Conviction
Hamel, Eugene . . . . .	Attleboro . . . . .	Attleboro . . . . .	Apr. 21, 1932	Conviction
Joubert, John . . . . .	Lawrence . . . . .	Lawrence . . . . .	Apr. 14, 1932	Conviction
Lahage, Abe . . . . .	Nantasket . . . . .	Hingham . . . . .	Sept. 7, 1932	Conviction
Lalley, Edward . . . . .	Attleboro . . . . .	Attleboro . . . . .	Mar. 29, 1932	Conviction
Mylott, Albert . . . . .	Abington . . . . .	Abington . . . . .	Oct. 4, 1932	Conviction
Nearhos, George . . . . .	Waltham . . . . .	Waltham . . . . .	Aug. 22, 1932	Conviction
Nougieria, Joseph . . . .	Plymouth . . . . .	Plymouth . . . . .	Sept. 8, 1932	Conviction
Pacific Restaurant of Nantucket, Inc. . . . .	Nantucket . . . . .	Nantucket . . . . .	Sept. 7, 1932	Conviction <sup>1</sup>
Pierson, Louise J. R. . . .	Orleans . . . . .	Provincetown . . . .	Sept. 1, 1932	Conviction
Piper, Lena . . . . .	Gardner . . . . .	Gardner . . . . .	Sept. 9, 1932	Conviction
Rommo, Frank . . . . .	Milford . . . . .	Milford . . . . .	Aug. 13, 1932	Conviction
Toner, John L. . . . .	Nantucket . . . . .	Nantucket . . . . .	Oct. 13, 1932	Conviction <sup>2</sup>
Tsoutsanis, Stephen . . . .	Manchester . . . . .	Salem . . . . .	May 27, 1932	Conviction
Upton, Earl . . . . .	Brockton . . . . .	Stoughton . . . . .	July 12, 1932	Conviction

*For Sale of Milk from Which a Portion of the Cream had been removed*

Harris, Clinton A. . . . .	Shirley . . . . .	Ayer . . . . .	June 20, 1932	Conviction
La France, Louis G. . . . .	Berkley . . . . .	Taunton . . . . .	Feb. 12, 1932	Conviction
Piper, Lena . . . . .	Gardner . . . . .	Gardner . . . . .	Sept. 9, 1932	Conviction
Raposa, Manuel . . . . .	Westport . . . . .	Fall River . . . . .	Feb. 19, 1932	Conviction
Rombult, Julius . . . . .	Lynnfield . . . . .	Lynn . . . . .	July 7, 1932	Discharged

*For Sale of Milk Containing Added Water*

Bzowski, Samuel . . . . .	Methuen . . . . .	Methuen . . . . .	July 15, 1932	Conviction
Carter, John G. . . . .	Sherborn . . . . .	Natick . . . . .	Feb. 29, 1932	Conviction
Harriman, Maynard S. . . .	West Acton . . . . .	Concord . . . . .	May 16, 1932	Conviction
Mol, Frank . . . . .	South Hadley . . . .	Northampton . . . .	Apr. 14, 1932	Conviction
Morin, Joseph A. . . . .	Methuen . . . . .	Lawrence . . . . .	July 18, 1932	Conviction
Perry, Louie . . . . .	Westport . . . . .	Fall River . . . . .	Mar. 11, 1932	Discharged
Prentiss, Abraham . . . . .	West Acton . . . . .	Concord . . . . .	May 16, 1932	Conviction
Sierpina, Frank . . . . .	Methuen . . . . .	Methuen . . . . .	July 15, 1932	Conviction
Trombly, Peter B. . . . .	Grafton . . . . .	Grafton . . . . .	June 7, 1932	Conviction

<sup>1</sup> Suspended for sentence for one year.

<sup>2</sup> Appealed.

*Selling Unpasteurized Milk as Pasteurized*

NAME	ADDRESS	COURT	DATE	RESULT
Barstow, Foster S.	Wakefield	Malden	June 10, 1932	Conviction
Henshaw, John B.	Salem	Salem	Apr. 15, 1932	Conviction
Henshaw, Wallace L.	Salem	Salem	Apr. 15, 1932	Conviction
Hood & Sons, H. P.	Lowell	Lowell	Sept. 27, 1932	-1
La Rose, Antonio	Dracut	Lowell	Oct. 22, 1932	Conviction
La Rose, Emile	Dracut	Lowell	Oct. 22, 1932	Conviction
Lombard, John E.	Ipswich	Ipswich	Oct. 22, 1932	-2
Lovelace, Walter	Peabody	Peabody	May 14, 1932	Discharged
Mallory, Inc., F. B.	Springfield	Springfield	Oct. 17, 1932	Conviction
McAdams & Bros. Inc., J. F.	Chelsea	Chelsea	Oct. 21, 1932	Conviction
Mortis, Emmanuel	Peabody	Peabody	Sept. 9, 1932	Conviction
Recka, Anthony	Waltham	Waltham	Sept. 22, 1932	Dismissed
Rodden, Hugh A.	Salem	Salem	Nov. 16, 1932	Conviction
Tochach, Howard H.	Atkinson, N. H.	Haverhill	June 10, 1932	Conviction
Whittaker, Henry	Fairhaven	New Bedford	Feb. 24, 1932	Conviction
Zervas, George	Ipswich	Ipswich	Oct. 22, 1932	Conviction <sup>3</sup>

<sup>1</sup> Probation without finding.<sup>2</sup> On file without finding.<sup>3</sup> Suspended for sentence for one year.*For Violation of Pasteurization Law and Regulations*

Barstow, Foster S.	Wakefield	Malden	June 10, 1932	Conviction
Barstow, Foster S.	Wakefield	Malden	June 10, 1932	Conviction
Barstow, Foster S.	Wakefield	Malden	June 10, 1932	Conviction
Bernard, Joseph	South Dartmouth	New Bedford	Mar. 21, 1932	Conviction
Boudreau, George	Lowell	Lowell	Sept. 16, 1932	Conviction
Brooks, Michael	Worcester	Worcester	Apr. 26, 1932	Conviction
Burkinshaw, Chester J.	Salem	Salem	Apr. 15, 1932	Conviction
Burnett, Miles	North Adams	North Adams	Nov. 1, 1932	Conviction
Curley, Roy	Hudson	Hudson	Oct. 13, 1932	Conviction <sup>7</sup>
Desmarais, Calixte	Swansea	Fall River	Oct. 31, 1932	Conviction <sup>1</sup>
Driscoll & Co., W. B.	South Boston	South Boston	July 29, 1932	Conviction
Feldman, Harry	Everett	Malden	Oct. 11, 1932	Conviction
Forest Lake Dairy Co. Inc.	Palmer	Palmer	Oct. 28, 1932	Conviction
Fortier, Sylvia	Fall River	Fall River	Oct. 31, 1932	Conviction <sup>2</sup>
Fortier, Sylvia	Fall River	Fall River	Oct. 31, 1932	Conviction <sup>3</sup>
Fortier, Sylvia	Fall River	Fall River	Oct. 31, 1932	Conviction <sup>3</sup>
Gage, Albert J.	Pembroke	Plymouth	Oct. 18, 1932	Conviction
Gage, Albert J.	Pembroke	Plymouth	Oct. 18, 1932	Conviction
Gage, Albert J.	Pembroke	Plymouth	Oct. 18, 1932	Conviction
Gannon, Frank M.	North Billerica	Lowell	Aug. 4, 1932	Conviction
Giroux, Joseph E. and Hercules J.	Somerville	Somerville	July 17, 1932	Conviction
Gushee, Chester	Dorchester	Dorchester	July 15, 1932	Conviction
Henshaw, Wallace L.	Salem	Salem	Apr. 15, 1932	Conviction
Holyoke Producers Dairy Co.	Holyoke	Holyoke	May 18, 1932	Conviction
Horgan, John J.	Danvers	Salem	Sept. 15, 1932	Conviction
Horgan, William E.	Danvers	Salem	Sept. 15, 1932	Conviction
Lombard, John E.	Ipswich	Ipswich	Oct. 22, 1932	-4
Marlboro Dairy Co., Inc.	Marlborough	Marlborough	Feb. 5, 1932	Conviction
Mortis, Emmanuel	Peabody	Peabody	Jan. 11, 1932	Conviction
Mortis, Emmanuel	Peabody	Peabody	Sept. 9, 1932	Conviction
Nickerson, Arthur W.	Saugus	Saugus	Sept. 24, 1932	Conviction
Niezgoda, Konstanty	Holyoke	Holyoke	Jan. 27, 1932	Conviction
Pratt, John W.	Peabody	Peabody	Nov. 29, 1932	Conviction <sup>5</sup>
Prescott Co., J. B.	Bedford	Concord	Aug. 12, 1932	Conviction
Rogers, William	Fairhaven	New Bedford	Oct. 24, 1932	Conviction
Shaw, Russell	Canton	Stoughton	Nov. 30, 1932	Dismissed
Soares, John O.	Somerset	Fall River	Oct. 31, 1932	Conviction <sup>1</sup>
Voloza, John	Somerset	Fall River	Oct. 31, 1932	Conviction <sup>1</sup>
Wade, Elmer	Taunton	Taunton	Apr. 15, 1932	Discharged
Ware, Dwight	Abington	Abington	May 3, 1932	Conviction
Weiler & Sons, E.	Jamaica Plain	Roxbury	July 13, 1932	Conviction
Westwood Farms Milk Co.	Jamaica Plain	Roxbury	July 13, 1932	Conviction
Zala, Joseph	North Dartmouth	New Bedford	Apr. 4, 1932	Conviction
Zervas, George	Ipswich	Ipswich	Oct. 22, 1932	Conviction <sup>6</sup>

<sup>1</sup> Pledged guilty; placed on probation.<sup>2</sup> Fined \$10; given until December 7, 1932, to pay.<sup>3</sup> Sentence suspended to May 3, 1933.<sup>4</sup> On file without finding.<sup>5</sup> Suspended until December 16, 1932, at which time complaint will be dismissed if plant is in order.<sup>6</sup> Sentence suspended for one year.<sup>7</sup> Appealed.*For Violation of Grade A Regulations*

Marlboro Dairy Co., Inc.	Marlborough	Marlborough	Feb. 5, 1932	Conviction
Marlboro Dairy Co., Inc.	Marlborough	Marlborough	Sept. 21, 1932	Discharged
McNeil, Allan J.	Wellesley	Dedham	July 8, 1932	Conviction
Shaw, John C.	Taunton	Taunton	Aug. 9, 1932	Conviction

**BUTTER**  
(Low Standard)

Robinovitz, Max	Springfield	Springfield	Apr. 27, 1932	Conviction
Upton, Earl D.	Brockton	Newton	Aug. 5, 1932	Conviction



*For Sale of Adulterated or Misbranded Foods Other than Milk and Milk Products*CLAMS  
(Sewage Polluted)

NAME	ADDRESS	COURT	DATE	RESULT
Bayley, Samuel . . . .	Ipswich . . . .	Lynn . . . .	Oct. 25, 1932	Discharged
Boylan, Clifford C. . . .	Ipswich . . . .	Ipswich . . . .	Dec. 17, 1931	Discharged
Brown, Rufus S. . . .	Salisbury . . . .	Newburyport . . . .	Sept. 29, 1932	Conviction <sup>1</sup>
Duffy, Joseph . . . .	Revere . . . .	Boston . . . .	Sept. 30, 1932	Conviction
Miller, Lawrence C. . . .	Ipswich . . . .	Chelsea . . . .	Aug. 27, 1932	Conviction
O'Brien, William F. . . .	Salem . . . .	Salem . . . .	Nov. 9, 1932	Conviction
Oldbash, Alexander . . . .	Saugus . . . .	Lynn . . . .	Dec. 11, 1931	Conviction
Perkins, Terrance H. . . .	Ipswich . . . .	Lynn . . . .	Oct. 5, 1932	Discharged
Randall, Chaney . . . .	Revere . . . .	Chelsea . . . .	Feb. 1, 1932	Conviction
Smart, Albert . . . .	Lynn . . . .	Boston . . . .	Jan. 28, 1932	Conviction
Smart, Albert . . . .	Lynn . . . .	Boston . . . .	Sept. 21, 1932	Conviction
Smart, Philip . . . .	Lynn . . . .	Lynn . . . .	Dec. 11, 1931	Conviction
Smart, Philip . . . .	Lynn . . . .	Lynn . . . .	Oct. 7, 1932	Conviction <sup>1</sup>
Wells, Victor . . . .	Revere . . . .	Chelsea . . . .	Jan. 17, 1932	Conviction
Young, Charles M. . . .	Nantasket . . . .	Hingham . . . .	Aug. 17, 1932	Conviction

<sup>1</sup> Appealed.

## HAMBURG STEAK

(Selling, or offering for sale, meat containing sodium sulphite in violation of the regulations of the Department of Public Health)

American Beef Co., Inc. . . .	Boston . . . .	Boston . . . .	Aug. 18, 1932	Conviction
Atlantic & Pacific Tea Co., Great . . . .	Springfield . . . .	Springfield . . . .	Mar. 25, 1932	Conviction
Berger, Joseph . . . .	North Adams . . . .	North Adams . . . .	Nov. 30, 1932	Conviction
Bernstein, Louis . . . .	Springfield . . . .	Springfield . . . .	Apr. 27, 1932	Conviction
Bettincourt, Manuel . . . .	New Bedford . . . .	New Bedford . . . .	Aug. 11, 1932	Conviction
Dobosz, John . . . .	Holyoke . . . .	Holyoke . . . .	Oct. 11, 1932	Conviction
Folsom's Market, Inc. . . .	Roxbury . . . .	Roxbury . . . .	July 22, 1932	Conviction
Gammerman, Samuel . . . .	Boston . . . .	Boston . . . .	July 20, 1932	Conviction
Gill, Anthony . . . .	Worcester . . . .	Worcester . . . .	Nov. 9, 1932	Conviction
Kastan, Frank . . . .	Boston . . . .	Boston . . . .	July 20, 1932	Conviction
Kilcourse, Thomas . . . .	Springfield . . . .	Springfield . . . .	Mar. 25, 1932	Conviction
Kocot, Boleslaw . . . .	Northampton . . . .	Northampton . . . .	May 12, 1932	Conviction
Kronick, Jacob . . . .	North Adams . . . .	North Adams . . . .	Nov. 30, 1932	Conviction
Levitte, Harry . . . .	North Adams . . . .	North Adams . . . .	Nov. 30, 1932	Conviction
Lipsky, Ruben . . . .	Brookline . . . .	Brookline . . . .	July 11, 1932	Conviction
Riley, John . . . .	Wollaston . . . .	Quincy . . . .	July 12, 1932	Conviction
Rydziel, Anthoni . . . .	Worcester . . . .	Worcester . . . .	Nov. 9, 1932	Conviction
Selansky, Harry . . . .	Melrose . . . .	Malden . . . .	Oct. 11, 1932	Conviction
Tillman, Isidore . . . .	Springfield . . . .	Springfield . . . .	Dec. 10, 1931	Conviction

## MAPLE SYRUP

(Contained cane sugar)

McLellan's Store . . . .	Springfield . . . .	Springfield . . . .	Mar. 2, 1932	Conviction
Panos, Peter . . . .	Watertown . . . .	Waltham . . . .	Apr. 28, 1932	Conviction
Piatos, Nestor . . . .	Worcester . . . .	Worcester . . . .	Apr. 29, 1932	Conviction
Tuvman, Samuel . . . .	Springfield . . . .	Springfield . . . .	Apr. 1, 1932	Conviction

## SAUSAGE

(Contained starch in excess of 2 per cent)

Corey, Arthur . . . .	Lawrence . . . .	Lawrence . . . .	Mar. 11, 1932	Conviction
Lussier, Armand . . . .	Fall River . . . .	Fall River . . . .	Apr. 6, 1932	Conviction
Luzio, Gaudenze . . . .	Dorchester . . . .	Dorchester . . . .	Feb. 16, 1932	Conviction
Pelletier, Frederick A. . . .	Taunton . . . .	Taunton . . . .	Jan. 21, 1932	Conviction
Ross, John . . . .	Clarksburg . . . .	North Adams . . . .	Dec. 18, 1931	Discharged

## SAUSAGE

(Contained a compound of sulphur dioxide not properly labeled)

Archambault, Alphonse . . . .	Holyoke . . . .	Holyoke . . . .	Feb. 4, 1932	Conviction <sup>1</sup>
Barthel, Eugene E. . . .	Gardner . . . .	Gardner . . . .	Apr. 15, 1932	Discharged
Beaudoin, Joseph . . . .	Holyoke . . . .	Holyoke . . . .	Feb. 11, 1932	Conviction
Kutzenko, Samuel . . . .	Springfield . . . .	Springfield . . . .	Apr. 13, 1932	Conviction
Levine, Morris . . . .	Springfield . . . .	Springfield . . . .	Apr. 1, 1932	Conviction
Pallot, Casper . . . .	Holyoke . . . .	Holyoke . . . .	Jan. 7, 1932	Conviction
Romito, Frank . . . .	Springfield . . . .	Springfield . . . .	Mar. 25, 1932	Conviction
Vogel, Erhart F. . . .	Springfield . . . .	Springfield . . . .	Mar. 2, 1932	Conviction

## VINEGAR

Dupuis, Adjutor . . . .	Fall River . . . .	Fall River . . . .	Jan. 28, 1932	Conviction
Dupuis, Adjutor . . . .	Fall River . . . .	Fall River . . . .	Jan. 28, 1932	Conviction
Dupuis, Adjutor . . . .	Fall River . . . .	Fall River . . . .	Jan. 28, 1932	Conviction
Dupuis, Adjutor . . . .	Fall River . . . .	Fall River . . . .	Jan. 28, 1932	Conviction
Dupuis, Adjutor . . . .	Fall River . . . .	Fall River . . . .	Jan. 28, 1932	Conviction
Dupuis, Adjutor . . . .	Fall River . . . .	Fall River . . . .	Jan. 28, 1932	Conviction
Ladow, Bernard . . . .	Providence, R. I. . . .	Fall River . . . .	Mar. 23, 1932	Conviction
Ladow, Bernard . . . .	Providence, R. I. . . .	Fall River . . . .	May 13, 1932	Conviction
Ladow, Bernard . . . .	Providence, R. I. . . .	Fall River . . . .	May 13, 1932	Discharged

<sup>1</sup>Sentence suspended.

*For Sale of Decomposed Food*

Eggs					
NAME	ADDRESS	COURT	DATE	RESULT	
Buonaugurio, Camillo	Somerville	Somerville	Jan. 7, 1932	Conviction	
Colapietro, Leon	Springfield	Springfield	Dec. 2, 1931	Conviction	
Eskow, George	Taunton	Taunton	Oct. 14, 1932	Conviction	
First National Stores, Inc.	Peabody	Peabody	Oct. 10, 1932	Conviction	
First National Stores, Inc.	Salem	Salem	Nov. 9, 1932	Conviction	
Kopka, Wasel	Salem	Salem	Nov. 28, 1932	Conviction <sup>1</sup>	
Less, Abriham	North Adams	North Adams	Nov. 1, 1932	Conviction	
Tallarico, Joseph	North Adams	North Adams	Nov. 1, 1932	Conviction	

**HAMBURG STEAK**

Bettincourt, Manuel	New Bedford	New Bedford	Aug. 11, 1932	Conviction
Cohen, Simon	Gloucester	Gloucester	Jan. 22, 1932	Conviction

**LIVER**

Fitts Bros., Inc.	Framingham	Framingham	Mar. 14, 1932	Conviction
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**SAUSAGE**

Dovner, Maurice	Taunton	Taunton	Jan. 21, 1932	Conviction
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*False and Misleading Advertising***Eggs**

(Representing eggs which were not fresh as fresh eggs)

Bellanger, Harry	Springfield	Springfield	Sept. 21, 1932	Conviction
Brand, Saul	Roxbury	Roxbury	Jan. 27, 1932	Dismissed
Dauch, Richard C.	Holyoke	Holyoke	Mar. 3, 1932	Conviction
Gallup, Morris	Taunton	Taunton	Oct. 14, 1932	Conviction
Growers Outlet, Inc.	Holyoke	Holyoke	May 12, 1932	Conviction
Jacobs, Paul	Springfield	Springfield	Nov. 23, 1932	Conviction
Jacobs, Philip	Worcester	Worcester	Nov. 18, 1932	Conviction <sup>1</sup>
Joseph, Herbert	Gloucester	Gloucester	Jan. 22, 1932	Conviction
Klys, John	Indian Orchard	Springfield	Oct. 19, 1932	Conviction
Van Dyke Co., James	Fall River	Fall River	Jan. 20, 1932	Conviction

*Fov Violation of Bakery Laws*

Frechette, Alfonse L.	Newton	Newton	Dec. 17, 1931	Conviction
Hathaway Baking Co.	Cambridge	Cambridge	Oct. 21, 1932	Conviction
Mazzonei, Andrew	Newton Upper Falls	Newton	Dec. 17, 1931	Conviction
Spitz, Theodore A.	West Newton	Newton	Dec. 31, 1931	Conviction

*Fov Sale of Drugs Deficient in Strength***ARGYROL**

Beverly, Howard M.	Ayer	Ayer	July 18, 1932	Conviction
Case, James O.	East Boston	East Boston	May 21, 1932	Conviction
Cincotti, Leo	East Boston	East Boston	June 2, 1932	Conviction
Davidson, Aram	Allston	Brighton	May 10, 1932	Conviction
De Pietro, Joseph	East Boston	East Boston	May 19, 1932	Conviction
Dowst, F. Harold	Peabody	Peabody	Mar. 25, 1932	Conviction
Exidis, Michael D.	Springfield	Springfield	Sept. 14, 1932	Conviction <sup>2</sup>
Flaherty's Drug Store, Inc.	Arlington	Cambridge	Apr. 11, 1932	Conviction
Gostanian, Kevork	Allston	Brighton	May 10, 1932	Conviction
Hebbard Drug Co.	Lynn	Lynn	Apr. 8, 1932	Conviction
Hendrickson, Leonard	Oak Bluffs	Edgartown	Sept. 22, 1932	Conviction
Hennessy, Dennis L.	Danvers	Salem	Mar. 18, 1932	Conviction
Killelea, Edward T.	Leominster	Leominster	July 29, 1932	Conviction
Liggett Co., Louis K.	Salem	Salem	Mar. 18, 1932	Conviction
Lincoln Square Drug Co., Inc.	Worcester	Worcester	Apr. 1, 1932	Conviction
Marcus, Jacob	Quincy	Quincy	July 27, 1932	Discharged
McKeogh, Robert	Gardner	Gardner	May 20, 1932	Conviction
Mitchell, John H.	Haverhill	Haverhill	Apr. 27, 1932	Discharged
Pearlman, Albert	Brighton	Brighton	June 1, 1932	Discharged
Pearson, William	Oak Bluffs	Edgartown	Sept. 22, 1932	Dismissed
Quint, Arthur H.	Leominster	Leominster	July 15, 1932	Conviction
Savoie, Leonel	Lynn	Lynn	June 21, 1932	Conviction
Sullivan, Peter J.	Greenfield	Greenfield	Apr. 22, 1932	Conviction
Sweet, Walter H.	Haverhill	Haverhill	Apr. 27, 1932	Discharged
Whelan Drug Co., Inc.	Haverhill	Haverhill	Apr. 27, 1932	Discharged

**SWEET SPIRIT OF NITRE**

Dowst, F. Harold	Peabody	Peabody	Mar. 25, 1932	Conviction
Hennessy, Dennis L.	Danvers	Salem	Mar. 18, 1932	Conviction
McKeogh, Robert	Gardner	Gardner	May 20, 1932	Conviction
Terney, Louis B.	Springfield	Springfield	Apr. 27, 1932	Conviction

<sup>1</sup> Appealed.<sup>2</sup> Nolo on file.

*For Violation of the Laws Relative to Cold Storage*

## SELLING COLD STORAGE EGGS WITHOUT MARKING THE CONTAINER

NAME	ADDRESS	COURT	DATE	RESULT
Albert, Leon	Mattapan	Dorchester	Nov. 15, 1932	Conviction
Allaire, William	Chicopee	Chicopee	Feb. 12, 1932	Conviction
Boucher, Joseph	Springfield	Springfield	Dec. 10, 1931	Conviction
Boukalis, Peter	Worcester	Worcester	Nov. 9, 1932	Conviction
Dovner, Maurice	Taunton	Taunton	Jan. 21, 1932	Conviction
Fleishman, Philip	East Boston	East Boston	Feb. 18, 1932	Conviction
Galan, George	Roxbury	Roxbury	Jan. 27, 1932	Conviction
The Gloria Chain Stores, Inc.	Worcester	Worcester	Nov. 9, 1932	Conviction
Glynn, John	Charlestown	Charlestown	Nov. 17, 1932	Conviction <sup>1</sup>
Janowski, Konstanty	Norwood	Dedham	Feb. 17, 1932	Conviction
Kaplan, Benjamin	Southbridge	Southbridge	Dec. 11, 1931	Conviction
Koval, Adolph	Norwood	Dedham	Feb. 17, 1932	Conviction
Mangoglio, Baldassara	East Boston	East Boston	Feb. 18, 1932	Conviction
Mazzariello, Joseph	East Boston	East Boston	Feb. 19, 1932	Conviction
Morini, Eramdo	Norwood	Norwood	Feb. 17, 1932	Conviction
Pallot, Casper	Holyoke	Holyoke	Jan. 7, 1932	Conviction
Pelletier, Frederick A.	Taunton	Taunton	Jan. 21, 1932	Conviction
Peters, George	Worcester	Worcester	Nov. 9, 1932	Conviction
Pontone, Charles	Boston	Boston	Jan. 22, 1932	Conviction
Rolli, Alfredo	Lynn	Lynn	Feb. 18, 1932	Conviction
Ross, John	Clarksburg	North Adams	Dec. 18, 1931	Conviction
Shakarian, Thomas	East Boston	East Boston	Feb. 18, 1932	Conviction
Uservitch, John	Norwood	Dedham	Feb. 17, 1932	Conviction
Zohn, Charlie	East Boston	East Boston	Feb. 18, 1932	Conviction

## HOLDING ARTICLES OF FOOD IN COLD STORAGE FOR A PERIOD LONGER THAN TWELVE MONTHS WITHOUT THE CONSENT OF THE DEPARTMENT OF PUBLIC HEALTH

Shapiro, Abraham	Lynn	Boston	Dec. 14, 1931	Conviction
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*For Violation of the Laws Relative to Slaughtering*

## SLAUGHTERING OR AUTHORIZING SLAUGHTERING IN THE ABSENCE OF INSPECTOR

Burgess, Stephen	Wareham	Wareham	Feb. 4, 1932	Conviction
Scott, Wilbur T.	Buckland	Greenfield	Jan. 29, 1932	Conviction <sup>2</sup>
Strycharz, Clemens	Blackstone	Blackstone	Jan. 5, 1932	Conviction

<sup>1</sup> \$20 fine suspended; placed on probation until May 18, 1933.<sup>2</sup> Appealed.

## AS INSPECTOR OF SLAUGHTERING USED STAMP ILLEGALLY

Bradford, George	Buckland	Greenfield	Jan. 29, 1932	Conviction
Hepburn, Frederick	Wareham	Wareham	Feb. 4, 1932	Conviction

*For Violation of the Mattress Laws*

Graboyes, Louis	Fall River	Fall River	Nov. 10, 1932	Dismissed
National Mattress Co.	Boston	Boston	May 20, 1932	Conviction
Standard Mattress Co. Inc.	Springfield	Springfield	Sept. 14, 1932	Conviction
Tublin, Samuel	Fall River	Fall River	Nov. 10, 1932	Conviction

*Obstruction of an Inspector*

Mortis, Emmanuel	Peabody	Peabody	Jan. 11, 1932	Conviction
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## TABLE 2—Summary of Milk Statistics

Number above standard	4,659
Number below standard	976
Total samples	5,635
Number having more than 15% solids	50
"    "    between 14% and 15% solids	178
"    "    13% and 14% solids	983
"    "    12% and 13% solids	3,465
"    "    11% and 12% solids	864
"    "    10% and 11% solids	80
"    "    9% and 10% solids	14
"    "    8% and 9% solids	1
Number of samples showing removal of cream	74
Number of samples containing added water	46

50% of samples with solids between 12.20% and 12.95%.

69% of samples with solids between 12.00% and 13.21%.

80% of samples with solids between 11.81% and 13.45%.



TABLE 3. — *Average Composition of Milk Samples*

	TOTAL SAMPLES COLLECTED				SAMPLES NOT FOUND ADULTERATED			
	Number of Samples	Solids	Fat	Solids not Fat	Number of Samples	Solids	Fat	Solids not Fat
December . . . . .	232	12.62	3.96	8.66	230	12.63	3.97	8.66
January . . . . .	129	12.43	3.75	8.68	113	12.69	4.00	8.69
February . . . . .	212	12.53	3.95	8.58	205	12.58	3.99	8.59
March . . . . .	470	12.66	3.97	8.69	464	12.68	3.98	8.70
April . . . . .	407	12.48	3.88	8.60	401	12.49	3.89	8.60
May . . . . .	751	12.47	3.88	8.59	719	12.68	3.95	8.73
June . . . . .	920	12.50	3.89	8.61	899	12.53	3.91	8.62
July . . . . .	419	12.21	3.74	8.47	397	12.30	3.79	8.51
August . . . . .	785	12.36	3.80	8.56	777	12.38	3.82	8.56
September . . . . .	539	12.69	4.00	8.69	536	12.70	4.01	8.69
October . . . . .	405	12.72	3.93	8.97	404	12.72	3.93	8.79
November . . . . .	130	12.87	3.97	8.90	129	12.88	3.98	8.90
Totals . . . . .	5,399	12.51	3.89	8.62	5,265	12.59	3.93	8.66

TABLE 4. — *Summary of Bacteriological Examinations of Milk*

		CERTIFIED MILK	
Total samples . . . . .			109
Lowest count . . . . .			30
Highest count . . . . .			13,000
Number above 10,000 . . . . .			1
		RAW MILK SOLD AS SUCH	
Total samples . . . . .			214
Lowest count . . . . .			300
Highest count . . . . .			1,100,000
Geometric mean . . . . .			26,626
Number below 300,000 . . . . .			201
Number above 300,000 . . . . .			13
		RAW MILK INTENDED TO BE PASTEURIZED	
Total samples . . . . .			3,014
Lowest count . . . . .			less than 1,000
Highest count . . . . .			8,900,000
Geometric mean . . . . .			59,371
Number below 50,000 . . . . .			1,387
Number below 250,000 . . . . .			2,386
Number above 750,000 . . . . .			187
		GRADE A MILK	
Total samples . . . . .			96
Lowest count . . . . .			less than 10
Highest count . . . . .			640,000
Number below 25,000 . . . . .			80
Number above 25,000 . . . . .			16
		PASTEURIZED MILK	
Total samples . . . . .			622
Lowest count . . . . .			less than 10
Highest count . . . . .			890,000
Geometric mean . . . . .			10,840
Number below 50,000 . . . . .			520
Number above 50,000 . . . . .			102
		SUMMARY	
Total samples, including samples examined for hemolytic bacteria and samples of Grade A Massachusetts milk . . . . .			4,438
Samples complying with regulations . . . . .			4,081
Per cent of samples complying with regulations . . . . .			91.93

TABLE 5. — *Summary of Analyses of Food Samples*

CHARACTER OF SAMPLE	NOT DECLARED	ADULTERATED	TOTAL
	ADULTERATED OR MISBRANDED	OR MISBRANDED	
Bakery products . . . . .	1	2	3
Breakfast food . . . . .	2	1	3
Butter . . . . .	267	23	290
Candy . . . . .	15	1	16
Canned goods . . . . .	6	—	6
Condimental sauces . . . . .	2	1	3
Cream . . . . .	15	3	18
Dates and figs . . . . .	6	2	8
Diabetic flour . . . . .	—	1	1
Egg noodles . . . . .	6	—	6
Eggs . . . . .	426	144	570
Flavoring extracts . . . . .	3	—	3
Ice cream . . . . .	12	—	12
Maple sugar . . . . .	3	—	3
Maple syrup . . . . .	19	9	28
Mayonnaise . . . . .	3	1	4
Meat products:			
Chicken . . . . .	—	1	1
Hamburg steak . . . . .	209	56	265
Liver . . . . .	1	4	5
Pork chops . . . . .	1	—	1
Sausages . . . . .	650	36	686
Stew meat . . . . .	14	—	14
Mince meat . . . . .	2	—	2
Pickles . . . . .	1	1	2
Scallops . . . . .	1	—	1
Vinegar . . . . .	116	56	172
Totals . . . . .	1,781	342	2,123

TABLE 6—*Summary of Analyses of Drug Samples*

CHARACTER OF SAMPLE	NOT DECLARED	ADULTERATED	TOTAL
	ADULTERATED OR MISBRANDED	OR MISBRANDED	
Argyrol solution . . . . .	137	54	191
Camphorated oil . . . . .	—	1	1
Castor oil . . . . .	1	—	1
Elixir of potassium bromide . . . . .	4	4	8
Ether . . . . .	2	1	3
Lime water . . . . .	—	1	1
Magnesium citrate solution . . . . .	3	1	4
Proprietary drugs . . . . .	4	2	6
Quinine pills . . . . .	2	—	2
Silver nucleinate . . . . .	14	—	14
Spiritus frumenti . . . . .	—	2	2
Spirit of nitrous ether . . . . .	40	15	55
Tincture of iodine . . . . .	1	—	1
Zinc oxide ointment . . . . .	2	—	2
Totals . . . . .	210	81	291

TABLE 7. — *Liquor Report for 1932*  
*Character of Samples*

CITIES AND TOWNS	Beer	Cider	Wine	Distilled spirits	Extracts	Alcohol	Miscellaneous	Total
Boston . . . . .	533	—	87	798	30	246	57	1,751
Cambridge . . . . .	124	—	13	142	—	22	14	315
Fitchburg . . . . .	32	—	3	4	—	5	—	44
Lawrence . . . . .	32	—	2	11	—	2	2	49
Leominster . . . . .	15	—	2	11	—	5	—	33
Lowell . . . . .	141	—	8	139	—	8	3	299
Lynn . . . . .	68	—	9	131	—	19	3	230
Malden . . . . .	13	—	5	12	—	8	—	38
Marlborough . . . . .	26	—	2	20	—	4	1	53
Medford . . . . .	7	—	2	14	—	6	—	29
Newburyport . . . . .	18	—	3	5	—	—	3	29
Peabody . . . . .	43	—	2	43	—	1	2	91
Plymouth . . . . .	22	1	6	6	—	2	—	37
Quincy . . . . .	43	—	12	42	—	13	—	110
Revere . . . . .	27	—	—	5	—	—	—	32
Salem . . . . .	29	—	—	38	—	38	—	105
Somerville . . . . .	24	—	—	41	—	12	1	78
Springfield . . . . .	114	2	42	202	1	17	5	383
Waltham . . . . .	55	—	8	9	—	8	1	81
Weymouth . . . . .	14	—	4	27	—	4	—	49
Woburn . . . . .	8	—	—	14	—	6	—	28
Dep't. Pub. Safety . . . . .	146	1	18	129	—	9	1	304
Met. Dist. Com. . . . .	3	—	—	18	—	7	—	28
Miscellaneous* . . . . .	244	9	31	260	4	62	4	614
Totals . . . . .	1,781	13	259	2,121	35	504	97	4,810

\*From 91 towns submitting less than twenty-five samples each.

TABLE 8.— *Summary of Analyses of Drugs, Chemicals and Poisons, Submitted by the Police and by the Fish and Game Division*

CHARACTER OF SAMPLE	NUMBER OF SAMPLES
Morphin . . . . .	12
Morphin derivative . . . . .	1
Heroin . . . . .	21
Codein . . . . .	1
Opium . . . . .	7
Preparations containing alcohol—no other poison . . . . .	15
Ergot preparations . . . . .	4
Apioi capsules . . . . .	1
Oil of tansy . . . . .	1
Wintergreen oil . . . . .	1
Quinin . . . . .	1
Strychnin . . . . .	2
Antipyrine . . . . .	1
Chlorazine . . . . .	1
Eupphthalmin pills . . . . .	1
Caffein pills . . . . .	1
Bread containing lead arsenate . . . . .	1
Meat free from poison . . . . .	1
Chemicals examined for poison with negative results . . . . .	32
Totals . . . . .	105

TABLE 9. — *Summary of Inspections of Bakeries Made by the Division*

Number of such bakeries inspected . . . . .	265
Number of defects found as follows:—	
Floors not properly constructed or maintained . . . . .	29
Walls not properly constructed or maintained . . . . .	12
Ceilings not properly constructed or maintained . . . . .	5
Storage facilities not properly constructed or maintained . . . . .	3
Apparatus not properly constructed or maintained . . . . .	25
Stock not properly protected . . . . .	14
Products not properly protected . . . . .	32
Flies abundant . . . . .	6
Flour storage unsatisfactory . . . . .	4
Tobacco used in bakery . . . . .	5
Absence of garbage can . . . . .	2
Toilets unsatisfactory . . . . .	12
Animals in bakery . . . . .	11
Total defects . . . . .	160



TABLE 10. — *Articles Other than Fish placed in Cold Storage from December 1, 1931, to December 1, 1932*

	Butter (lbs.)	Eggs (Dozens)	Broken- out Eggs (lbs.)	Broilers (lbs.)	Roasters (lbs.)	Fowls (lbs.)	Turkeys (lbs.)	Miscel- laneous Poultry (lbs.)	Beef (lbs.)	Pork (lbs.)	Lamb and Mutton (lbs.)	Miscel- laneous Meats (lbs.)
December	500,669	240,120	288,813	92,253	1,474,292	248,449	1,155,537	464,739	676,697	2,312,061	225,716	980,477
January	612,740	209,670	316,184	67,933	493,929	191,707	493,270	265,391	342,568	2,089,468	82,615	1,295,384
February	450,377	229,890	217,000	85,049	401,561	181,034	211,692	131,861	303,129	3,184,986	14,658	1,123,862
March	337,765	631,620	460,702	110,662	328,758	244,616	151,731	169,307	250,433	1,746,194	11,703	1,210,444
April	446,500	2,418,210	941,650	49,267	116,935	393,993	106,886	202,391	262,021	1,055,153	58,658	838,680
May	1,827,335	2,961,840	1,137,510	76,401	243,560	299,880	76,296	563,443	337,438	466,274	48,828	870,850
June	5,042,868	1,459,470	1,122,615	116,800	116,800	208,803	150,409	559,046	234,154	804,075	64,857	937,402
July	3,377,426	612,180	735,090	89,208	121,073	198,315	49,602	368,001	208,182	1,919,213	74,476	701,508
August	1,660,178	566,760	417,975	104,127	136,018	131,774	31,828	367,275	242,117	651,481	62,583	703,991
September	861,860	382,230	204,847	155,122	269,052	135,241	39,437	218,207	179,888	471,097	155,137	661,609
October	804,040	420,210	325,135	97,635	645,324	189,845	29,371	146,159	226,231	562,036	142,238	812,411
November	415,103	282,030	283,647	97,859	1,373,029	140,329	1,513,799	411,542	488,643	944,250	100,834	1,004,253

TABLE 11. — *Articles Other than Fish on Hand in Cold Storage on the First Day of the Month, from January 1, 1932, through December 1, 1932*

	Butter (lbs.)	Eggs (Dozens)	Broken- out Eggs (lbs.)	Broilers (lbs.)	Roasters (lbs.)	Fowls (lbs.)	Turkeys (lbs.)	Miscel- laneous Poultry (lbs.)	Beef (lbs.)	Pork (lbs.)	Lamb and Mutton (lbs.)	Miscel- laneous Meats (lbs.)
January	1,886,632	816,370	1,729,401	702,474	2,988,618	526,463	1,361,357	1,277,759	1,073,260	3,288,271	557,800	1,090,402
February	1,538,961	136,530	1,575,833	666,888	3,080,439	544,525	1,764,945	1,235,416	1,088,919	4,357,043	429,939	1,668,913
March	1,031,795	93,270	1,293,179	598,349	2,849,408	455,350	1,716,138	903,857	1,110,824	6,434,344	298,689	1,983,617
April	590,677	559,830	1,142,814	524,408	2,293,041	556,042	1,560,395	687,280	1,018,076	635,497	133,727	2,412,195
May	544,256	2,830,680	1,575,796	333,995	1,660,094	392,853	1,371,218	550,542	972,578	5,590,197	84,890	1,866,685
June	2,004,258	5,574,370	2,032,193	287,820	1,277,799	366,142	1,219,243	826,181	1,015,498	3,591,373	68,835	1,771,401
July	6,483,138	6,648,630	2,522,789	185,096	906,702	429,145	1,096,052	992,943	1,923,132	3,214,412	80,285	1,356,608
August	9,186,199	6,732,030	2,696,767	183,036	671,219	394,049	870,054	1,195,169	739,399	3,229,498	91,341	1,234,776
September	9,455,960	6,191,580	2,505,692	206,101	423,992	269,796	325,432	1,344,313	599,642	2,677,485	99,605	959,302
October	7,863,823	4,910,670	2,160,409	231,128	505,279	202,434	289,368	1,409,042	461,673	1,612,056	178,064	828,282
November	5,788,934	2,924,280	1,834,715	337,285	978,177	221,456	38,560	1,341,796	507,126	1,390,381	216,558	775,553
December	3,280,482	1,060,860	1,517,133	351,997	2,157,466	253,871	1,399,882	1,315,949	703,866	1,519,568	197,388	605,733

TABLE 12. — *Fish placed in Cold Storage from December 15, 1931, to December 15, 1932*

	Bluefish	Butterfish	Catfish	Ciscoes	Cod, Hake, Pollock and Haddock	Flounders	Haddock	Pillets	Halibut	Herring	Macarel	Fall and Silver Salmon	Salmon all Others	Snaa	Smelts, Eulachon, etc.	Squid	Whitefish	Whiting	Miscellaneous Frozen	Fish (lbs.)
January	1,593	7,875	*	1,250	603,300	*	**	**	80,482	165,560	51,988	66,815	2,549	2,800	86,650	19,795	-	5,020	349,221	
February	720	3,442	*	-	425,433	*	**	**	94,344	18,010	10,485	116,498	4,227	194	508,523	-	-	-	324,041	
March	1,448	3,639	*	-	204,157	*	**	**	80,241	62,495	10,745	30,860	18,222	522	143,882	8,192	-	-	96,585	
April	1,457	740	*	-	1,932,430	*	**	**	7,212	153,030	114,030	27,591	250	89	14,704	8,053	2,860	50,770	242,954	
May	1,943	236	*	9,625	2,425,632	*	**	**	4,273	1,060,955	589,280	118	20	1,101	395	933,878	140	90,531	558,233	
June	239	12,717	*	1,700	312,667	*	**	**	38,232	117,560	843,528	200	12,614	1,521	66	90	1,187,330	2,478,094	306,300	
July	3,368	149,491	*	15,770	411,750	7,765	1,374,314	39,225	4,273	274,837	2,701,028	6,660	9,149	360	260	182,076	310	1,803,203	332,979	
August	10,783	96,117	150	1,700	409,805	8,339	1,812,095	39,225	39,225	274,837	2,701,028	6,660	9,149	360	260	97,033	241	238,856	417,652	
September	947	3,320	*	2,575	409,805	8,339	1,812,095	39,225	80,826	418,220	848,020	11,296	13,988	29,500	398	26,510	241	118,782	417,821	
October	5,129	4,537	140	12,157	427,609	19,863	1,261,853	46,448	174,455	2,690,095	547,746	34,559	15,987	936	240	-	1,114	273,545	236,505	
November	787	15,331	279	1,200	199,430	19,101	412,115	412,115	142,571	174,455	547,746	34,559	15,987	936	240	-	55	273,793	345,969	
December	1,700	1,611	684	6,564	153,152	63,827	248,781	248,781	144,221	129,388	102,545	56,228	11,195	-	21,500	-	42	12,741	365,479	

TABLE 13. — *Fish on Hand in Cold Storage on the Fifteenth Day of the Month, from January 15, 1932, through December 15, 1932*

	Bluefish	Butterfish	Catfish	Ciscoes	Cod, Hake, Pollock and Haddock	Flounders	Haddock	Pillets	Halibut	Herring	Macarel	Fall and Silver Salmon	Salmon all Others	Snaa	Smelts, Eulachon, etc.	Squid	Whitefish	Whiting	Miscellaneous Frozen	Fish (lbs.)
January	13,800	299,505	*	7,278	1,998,983	*	**	**	278,626	663,711	6,552,612	104,905	50,185	39,642	92,965	685,156	16,470	4,116,935	2,359,011	
February	7,938	193,806	*	604	1,528,440	*	**	**	136,561	354,699	4,250,844	120,430	38,383	19,420	458,469	554,720	12,033	3,179,192	1,933,716	
March	4,532	85,784	*	354	472,173	*	**	**	117,458	291,706	2,400,568	53,961	36,619	6,840	325,549	356,049	3,351	1,916,032	1,402,108	
April	2,800	15,485	*	-	1,941,910	*	**	**	64,424	227,723	645,117	16,839	13,622	1,001	62,922	132,411	1,688	1,243,475	921,376	
May	3,573	5,312	*	6,889	1,401,994	*	**	**	62,697	1,016,405	925,065	12,233	10,599	1,816	49,430	1,025,173	1,748	1,010,367	1,005,140	
June	3,108	13,498	*	6,889	2,695,711	*	**	**	57,971	892,751	1,646,792	10,339	20,144	2,012	45,390	2,143,391	1,748	3,225,837	972,244	
July	5,651	158,165	*	6,202	2,102,222	*	**	**	87,195	738,762	4,122,243	8,340	41,436	5,485	41,803	2,250,354	1,488	4,634,195	1,065,724	
August	15,691	253,582	15,986	21,832	649,473	44,639	2,787,610	44,639	118,254	751,152	6,175,035	14,460	40,274	4,401	37,573	2,284,041	1,508	4,733,904	996,792	
September	13,151	244,988	10,966	16,020	885,487	39,798	3,704,148	39,798	163,648	886,532	6,660,153	15,875	42,151	33,433	34,558	2,182,349	1,839	4,508,450	1,225,753	
October	15,181	238,386	10,391	23,924	675,526	51,021	3,554,422	51,021	191,728	910,339	9,008,678	25,102	51,208	31,908	30,289	2,013,571	1,266	4,132,505	1,158,118	
November	10,713	218,242	10,033	10,583	675,526	51,237	2,476,789	51,237	314,762	776,422	8,867,633	82,732	60,560	30,280	35,346	1,802,520	1,301	3,915,551	1,181,289	
December	8,184	146,950	10,208	10,214	639,009	65,744	1,664,774	65,744	241,392	645,301	7,472,835	82,732	50,692	18,724	30,554	1,582,177	812	2,972,095	1,257,001	

\*Included in Miscellaneous Frozen Fish.

\*\*Included in Cod, Hake, Pollock and Haddock

## Summary of Tables 14, 15 and 16

Requests for extension of time granted					339
Butter	1	Meat and Meat Products			37
Eggs	72	Game			3
Poultry	23	Fish			203
Requests for extension of time not granted					11
Butter	1	Fish			10
Articles ordered removed from storage (no requests made)					149
Butter	1	Meat and Meat Products			21
Eggs	1	Game			1
Poultry	35	Fish			90

TABLE 14. — *Requests for Extension of Time Granted on Goods in Cold Storage from December 1, 1931, to December 1, 1932*

[Reason for such extension being that goods were in proper condition for further storage]

ARTICLE	Weight (Pounds)	Placed in Storage	Extension Granted to —	Name
Butter	2,400	July 17, 1931	Jan. 17, 1933	Kibbe Bros. Co.
Eggs	10,380	Mar. 16, 1931	June 16, 1932	National Biscuit Co.
Eggs, Frozen	2,280	Apr. 21, 1931	*Dec. 21, 1932	Seymour Packing Co.
Eggs, Frozen	132	Mar. 19, 1931	July 19, 1932	Stone Co., Chas. H.
Eggs, Frozen	1,500	Mar. 19, 1931	July 19, 1932	Stone Co., Chas. H.
Eggs, Frozen	4,530	Mar. 20, 1931	July 20, 1932	Stone Co., Chas. H.
Eggs, Mixed	5,940	May 1, 1931	Sept. 1, 1932	Brown & Sons, Inc., M.
Eggs, Mixed	6,090	May 1, 1931	Sept. 1, 1932	Brown & Sons, Inc., M.
Eggs, Mixed	3,990	May 1, 1931	Sept. 6, 1932	Brown & Sons, Inc., M.
Eggs, Mixed	5,610	May 1, 1931	Sept. 6, 1932	Brown & Sons, Inc., M.
Eggs, Mixed	3,750	May 1, 1931	Sept. 6, 1932	Brown & Sons, Inc., M.
Eggs, Mixed	2,610	May 23, 1931	Sept. 22, 1932	Brown & Sons, Inc., M.
Eggs, Mixed	5,100	May 23, 1931	Sept. 23, 1932	Brown & Sons, Inc., M.
Eggs, Mixed	4,320	Mar. 13, 1931	June 20, 1932	Standard Brands, Inc.
Eggs, Mixed	3,210	Mar. 17, 1931	June 17, 1932	Standard Brands, Inc.
Eggs, Mixed	480	May 13, 1931	Aug. 13, 1932	Standard Brands, Inc.
Eggs, Mixed	15,270	May 22, 1931	Aug. 22, 1932	Standard Brands, Inc.
Eggs, Mixed	1,800	May 31, 1931	Aug. 31, 1932	Standard Brands, Inc.
Eggs, Mixed	70	June 1, 1931	Aug. 1, 1932	Standard Brands, Inc.
Eggs, Mixed	1,320	Mar. 10, 1931	June 10, 1932	Stone Co., Chas. H.
Eggs, Mixed	11,700	Apr. 1, 1931	May 1, 1932	Stone Co., Chas. H.
Eggs, Mixed	16,260	Apr. 1, 1931	May 1, 1932	Stone Co., Chas. H.
Eggs, Mixed	11,520	May 1, 1931	July 1, 1932	Stone Co., Chas. H.
Eggs, Mixed	6,990	Mar. 19, 1931	June 15, 1932	Swift & Co.
Eggs, Mixed	28,480	Apr. 2, 1931	*Feb. 1, 1933	Swift & Co.
Eggs, Mixed	3,420	May 1, 1931	Sept. 1, 1932	Swift & Co.
Eggs, Mixed	66,704	May —, 1931	*Feb. 1, 1933	Swift & Co.
Eggs, Mixed	3,000	May 13, 1931	*Mar. 1, 1933	Swift & Co.
Eggs, Mixed	18,390	June 4, 1931	*Dec. 1, 1932	Swift & Co.
Eggs, Mixed	500	July 11, 1931	*Dec. 11, 1932	Swift & Co.
Eggs, Mixed	44,280	July 13, 1931	Sept. 13, 1932	Titman Egg Co.
Eggs, Sugared Mixed	6,390	May 1, 1931	Jan. 1, 1933	Swift & Co.
Eggs, Sugaryolk	3,750	Apr. 22, 1931	Oct. 20, 1932	Fairmont Creamery Co.
Eggs, Sugaryolk	12,270	Apr. 20, 1931	July 20, 1932	Standard Brands, Inc.
Egg Whites	210	July 7, 1931	Sept. 15, 1932	Fleishman, P.
Egg Whites	11,730	Apr. 27, 1931	*Dec. 27, 1932	Seymour Packing Co.
Egg Whites	3,720	Mar. 20, 1931	June 20, 1932	Standard Brands, Inc.
Egg Whites	11,610	Apr. 2, 1931	July 2, 1932	Standard Brands, Inc.
Egg Whites	5,250	Apr. 18, 1931	July 15, 1932	Standard Brands, Inc.
Egg Whites	160	May 13, 1931	Aug. 13, 1932	Standard Brands, Inc.
Egg Whites	510	May 13, 1931	Aug. 13, 1932	Standard Brands, Inc.
Egg Whites	10,380	May 31, 1931	Aug. 31, 1932	Standard Brands, Inc.
Egg Whites	150	June 1, 1931	Aug. 1, 1932	Standard Brands, Inc.
Egg Whites	1,890	Mar. —, 1931	July 1, 1932	Stone Co., Chas. H.
Egg Whites	3,090	May 1, 1931	July 1, 1932	Stone Co., Chas. H.
Egg Whites	2,550	Mar. 9, 1931	June 9, 1932	Swift & Co.
Egg Whites	15,180	Mar. 12, 1931	*Sept. 12, 1932	Swift & Co.
Egg Whites	740	Mar. 26, 1931	July 26, 1932	Swift & Co.
Egg Whites	500	Apr. 18, 1931	Aug. 17, 1932	Swift & Co.
Egg Whites	790	May —, 1931	Aug. 1, 1932	Swift & Co.
Egg Whites	35,100	May 4, 1931	Aug. 1, 1932	Titman Egg Co.
Eggs, Whole	12,950	May 27, 1931	Sept. 1, 1932	National Biscuit Co.
Eggs, Whole	810	Apr. 25, 1931	July 15, 1932	Standard Brands, Inc.
Eggs, Whole	6,930	Apr. 27, 1931	July 1, 1932	Standard Brands, Inc.
Eggs, Whole	150	May 1, 1931	Aug. 1, 1932	Standard Brands, Inc.
Eggs, Whole	13,500	Apr. 17, 1931	*Feb. 17, 1933	Swift & Co.
Egg Yolks	16,620	Apr. 22, 1931	Oct. 20, 1932	Fairmont Creamery Co.
Egg Yolks	18,000	May 14, 1931	Aug. 14, 1932	First National Stores, Inc.
Egg Yolks	29,250	May 28, 1931	Nov. 27, 1932	First National Stores, Inc.
Egg Yolks	7,350	Apr. 27, 1931	*Dec. 27, 1932	Seymour Packing Co.
Egg Yolks	2,790	Apr. 14, 1931	July 14, 1932	Standard Brands, Inc.
Egg Yolks	2,700	Apr. 18, 1931	July 15, 1932	Standard Brands, Inc.
Egg Yolks	6,600	May 1, 1931	May 15, 1932	Standard Brands, Inc.
Egg Yolks	120	June 1, 1931	Aug. 1, 1932	Standard Brands, Inc.
Egg Yolks	1,650	Mar. —, 1931	*Nov. 1, 1932	Stone Co., Chas. H.
Egg Yolks	510	Apr. 1, 1931	May 1, 1932	Stone Co., Chas. H.
Egg Yolks	4,500	May 1, 1931	July 1, 1932	Stone Co., Chas. H.
Egg Yolks	3,480	May 1, 1931	Aug. 1, 1932	Stone Co., Chas. H.
Egg Yolks	5,520	May 21, 1931	Aug. 1, 1932	Stone Co., Chas. H.



TABLE 14. — *Requests for Extension of Time Granted on Goods in Cold Storage from December 1, 1931, to December 1, 1932 — Continued*

ARTICLE	Weight (Pounds)	Placed in Storage	Extension Granted to —	Name
Egg Yolks . . . . .	2,160	May 21, 1931	Aug. 1, 1932	Stone Co., Chas. H.
Egg Yolks . . . . .	2,580	May 23, 1931	Sept. 1, 1932	Stone Co., Chas. H.
Egg Yolks . . . . .	6,000	May 13, 1931	*Mar. 1, 1933	Swift & Co.
Egg Yolks . . . . .	4,500	May 14, 1931	*Nov. 14, 1932	Swift & Co.
Broilers . . . . .	994	Nov. 7, 1931	Jan. 7, 1933	Childs, Sleeper & Co.
Chickens . . . . .	444	Aug. 11, 1931	*Nov. 30, 1932	Bartlett, Varney Co.
Chickens . . . . .	502	Sept. 22, 1931	Nov. 30, 1932	Bartlett, Varney Co.
Chickens . . . . .	590	Nov. 14, 1931	Dec. 31, 1932	Bartlett, Varney Co.
Chickens . . . . .	660	Nov. 14, 1931	Dec. 31, 1932	Bartlett, Varney Co.
Chickens . . . . .	715	Nov. 23, 1931	Feb. 23, 1933	Berman & Co., Inc.
Chickens . . . . .	3,250	Nov. 19, 1931	Feb. 6, 1933	Blair's Foodland, Inc.
Chickens, Broiling . . . . .	770	Sept. 3, 1931	Nov. 1, 1932	Greeley Co., James E.
Chickens and Fowl . . . . .	2,448	Dec. 10, 1931	Mar. 10, 1933	Berman & Co., Inc.
Chickens and Fowl . . . . .	6,182	Dec. 10, 1931	Mar. 10, 1933	Berman & Co., Inc.
Fowl . . . . .	3,889	Jan. 19, 1931	*Sept. 30, 1932	Bartlett, Varney Co.
Fowl . . . . .	5,049	Jan. 19, 1931	*Jan. 31, 1933	Bartlett, Varney Co.
Fowl . . . . .	3,229	Jan. 19, 1931	*Jan. 31, 1933	Bartlett, Varney Co.
Fowl . . . . .	2,457	Jan. 19, 1931	*Jan. 31, 1933	Bartlett, Varney Co.
Fowl . . . . .	1,125	Jan. 19, 1931	*May 31, 1932	Bartlett, Varney Co.
Fowl . . . . .	662	Aug. 4, 1931	Sept. 30, 1932	Bartlett, Varney Co.
Fowl . . . . .	467	Aug. 11, 1931	Sept. 30, 1932	Bartlett, Varney Co.
Fowl . . . . .	2,634	Aug. 24, 1931	*Jan. 31, 1933	Bartlett, Varney Co.
Fowl . . . . .	4,789	Aug. 28, 1931	*Jan. 31, 1933	Bartlett, Varney Co.
Fowl . . . . .	418	Aug. 28, 1931	Sept. 30, 1932	Bartlett, Varney Co.
Fowl . . . . .	5,750	Dec. 17, 1931	Mar. 16, 1933	Blair's Foodland, Inc.
Fowl . . . . .	3,862	Sept. 12, 1931	Dec. 12, 1932	Mades Co., Inc., M. M.
Geese . . . . .	2,686	Nov. 24, 1931	Feb. 24, 1933	Berman & Co., Inc.
Beef (Cow Meat) . . . . .	9,492	Jan. 14, 1931	Apr. 14, 1932	Batchelder, Snyder, Dorr & Doe Co.
Beef (Cow Meat) . . . . .	14,685	Mar. 13, 1931	*Sept. 13, 1932	Batchelder, Snyder, Dorr & Doe Co.
Sirloin Roasts . . . . .	181	Sept. 30, 1931	Dec. 30, 1932	Birdseye Packing Co.
Sirloin Roasts . . . . .	272	Sept. 30, 1931	Dec. 30, 1932	Birdseye Packing Co.
Sirloin Roasts . . . . .	36	Sept. 30, 1931	Dec. 30, 1932	Birdseye Packing Co.
Sirloin Roasts . . . . .	148	Sept. 30, 1931	Dec. 30, 1932	Birdseye Packing Co.
Sirloin Roasts . . . . .	278	Nov. 4, 1931	Feb. 4, 1933	Birdseye Packing Co.
Sirloin Roasts . . . . .	245	Nov. 4, 1931	Feb. 4, 1933	Birdseye Packing Co.
Sirloin Roasts . . . . .	235	Nov. 4, 1931	Feb. 4, 1933	Birdseye Packing Co.
Sirloin Roasts . . . . .	53	Nov. 4, 1931	Feb. 4, 1933	Birdseye Packing Co.
Sirloin Roasts . . . . .	233	Nov. 4, 1931	Feb. 4, 1933	Birdseye Packing Co.
Sirloin Roasts . . . . .	60	Nov. 4, 1931	Feb. 4, 1933	Birdseye Packing Co.
Sirloin Steaks . . . . .	5,628	Dec. 2, 1931	Apr. 3, 1933	Batchelder, Snyder, Dorr & Doe Co.
Sirloin Steaks . . . . .	5,073	Dec. 3, 1931	Apr. 3, 1933	Batchelder, Snyder, Dorr & Doe Co.
Sirloin Steaks . . . . .	2,565	Dec. 4, 1931	Apr. 3, 1933	Batchelder, Snyder, Dorr & Doe Co.
Veal . . . . .	8,144	Apr. 4, 1931	July 1, 1932	New England Dressed Meat & Wool Co.
Veal . . . . .	10,467	Apr. 11, 1931	July 1, 1932	New England Dressed Meat & Wool Co.
Veal . . . . .	4,563	Apr. 14, 1931	July 1, 1932	New England Dressed Meat & Wool Co.
Veal . . . . .	1,739	May 21, 1931	Dec. 21, 1932	New England Dressed Meat & Wool Co.
Veal Bridles . . . . .	3,985	May 14, 1931	Dec. 14, 1932	New England Dressed Meat & Wool Co.
Veal Legs . . . . .	1,276	June 26, 1931	Sept. 1, 1932	New England Dressed Meat & Wool Co.
Lamb Fores . . . . .	1,624	Mar. 11, 1931	June 11, 1932	Learnard Co., S. S.
Lamb Plucks . . . . .	4,823	July 21, 1931	Aug. 21, 1932	New England Dressed Meat & Wool Co.
Lamb Plucks . . . . .	900	Aug. 29, 1931	Jan. 1, 1933	New England Dressed Meat & Wool Co.
Pig Livers . . . . .	5,576	Jan. 17, 1931	Mar. 17, 1932	Mades Co., Inc., M. M.
Pork Livers . . . . .	16,500	Feb. 4, 1931	Mar. 3, 1932	Ganem & Sons, Joseph
Pork Loins . . . . .	4,600	Dec. 24, 1930	Mar. 2, 1932	Boston Beef Co.
Pork Loins . . . . .	12,250	Jan. —, 1931	*May 1, 1932	Georgian, Inc.
Pork Loins . . . . .	5,774	Jan. 27, 1931	*May 27, 1932	Peterson, M.
Pork Loin Roasts . . . . .	1,986	Dec. 6, 1930	Mar. 7, 1932	Birdseye Packing Co.
Pork Loin Roasts . . . . .	5,060	Jan. 2, 1931	*June 1, 1932	Birdseye Packing Co.
Pork Loin Roasts . . . . .	2,057	Jan. 21, 1931	*June 21, 1932	Birdseye Packing Co.
Pork Loin Roasts . . . . .	4,840	Nov. 27, 1931	Feb. 28, 1933	Frosted Food Sales Corp.
Pork Loin Roasts . . . . .	3,604	Nov. 30, 1931	Feb. 28, 1933	Frosted Food Sales Corp.
Pork Loin Roasts . . . . .	14,630	Dec. 3, 1931	Feb. 28, 1933	Frosted Food Sales Corp.
Pork Tenderloins . . . . .	1,320	Nov. 3, 1931	Feb. 3, 1933	Sears Co., Alfred
Sausage Meat . . . . .	3,452	Feb. 17, 1931	*Aug. 17, 1932	Birdseye Packing Co.
Venison . . . . .	18	Nov. 19, 1931	Jan. 19, 1933	Macdonald, George C.
Wild Boar Meat . . . . .	17	Oct. 16, 1931	Apr. 1, 1933	Bigelow, R. L.
Wild Boar Meat . . . . .	290	Oct. 16, 1931	Apr. 1, 1933	Bigelow, R. L.
Bluefish . . . . .	510	Oct. 3, 1931	Jan. 9, 1933	Pier Fish Co.
Butterfish . . . . .	165	July 17, 1931	Dec. 17, 1932	Busalacchi, Inc., T. & J.
Butterfish . . . . .	360	July 18, 1931	Dec. 17, 1932	Busalacchi, Inc., T. & J.
Cod Fillets . . . . .	80	Oct. 9, 1931	Dec. 9, 1932	Atlas Fish Co.
Cod Fillets . . . . .	3,020	Nov. 18, 1931	Jan. 1, 1933	Mills & Sons, W.

TABLE 14. — *Requests for Extension of Time Granted on Goods in Cold Storage from December 1, 1931, to December 1, 1932 — Continued*

ARTICLE	Weight (Pounds)	Placed in Storage	Extension Granted to —	Name
Cod Fillets . . . . .	1,050	Nov. 21, 1931	Jan. 1, 1933	Mills & Sons, W.
Cod Fillets . . . . .	2,240	Nov. 24, 1931	Jan. 1, 1933	Mills & Sons, W.
Cod Fillets . . . . .	920	Nov. 24, 1931	Jan. 1, 1933	Mills & Sons, W.
Cod Steak . . . . .	3,000	Dec. 22, 1930	Mar. 1, 1932	Best Fish Co.
Cod Steak . . . . .	1,315	Dec. 23, 1930	Mar. 1, 1932	Best Fish Co.
Cuttlefish . . . . .	120 *	Dec. 3, 1931	Nov. 3, 1932	Busalacchi, Inc., T. & J.
Eels . . . . .	500	June 11, 1931	Dec. 11, 1932	Russo & Sons Co.
Eels . . . . .	400	June 16, 1931	Dec. 16, 1932	Russo & Sons Co.
Eels . . . . .	90	June 19, 1931	Dec. 19, 1932	Russo & Sons Co.
Eels . . . . .	1,350	June 30, 1931	Dec. 30, 1932	Russo & Sons Co.
Eels . . . . .	195	Aug. 17, 1931	Dec. 16, 1932	Russo & Sons Co.
Eels, Sand . . . . .	685	July 21, 1931	Dec. 21, 1932	Atwood & Co.
Eels, Sand . . . . .	125	Oct. 7, 1931	Nov. 7, 1932	Banca Commerciale Italiana Trust Co.
Eels, Sand . . . . .	105	Oct. 15, 1931	Nov. 15, 1932	Banca Commerciale Italiana Trust Co.
Eels, Sand . . . . .	100	Nov. 6, 1931	Jan. 6, 1933	Banca Commerciale Italiana Trust <sup>1</sup> Co.
Eels, Sand . . . . .	250	June 17, 1931	Dec. 31, 1932	Tribuna Magri Co.
Eels, Sand . . . . .	440	June 23, 1931	Dec. 31, 1932	Tribuna Magri Co.
Eels, Sand . . . . .	150	Oct. 14, 1931	Jan. 15, 1933	Tribuna Magri Co.
Eels, Sand . . . . .	1,075	Oct. 20, 1931	Jan. 20, 1933	Tribuna Magri Co.
Eels, Sand . . . . .	1,150	Oct. 27, 1931	Jan. 15, 1933	Tribuna Magri Co.
Eels, Sand . . . . .	1,250	Oct. 28, 1931	Jan. 15, 1933	Tribuna Magri Co.
Eels, Sand . . . . .	800	Nov. 2, 1931	Jan. 2, 1933	Tribuna Magri Co.
Eels, Sand . . . . .	925	Nov. 3, 1931	Jan. 3, 1933	Tribuna Magri Co.
Eels, Small . . . . .	155	Nov. 14, 1931	Jan. 14, 1933	Banca Commerciale Italiana Trust Co.
Fillets . . . . .	435	Sept. 25, 1931	Dec. 25, 1932	Snow & Parker, Inc.
Fillets . . . . .	810	Oct. 9, 1931	Jan. 9, 1933	Snow & Parker, Inc.
Fillets, Fresh . . . . .	120	Sept. 3, 1931	Mar. 1, 1933	Collins-Lee Co.
Fillets, Fresh . . . . .	1,140	Sept. 4, 1931	Mar. 1, 1933	Collins-Lee Co.
Fillets, Fresh . . . . .	1,830	Sept. 5, 1931	Mar. 1, 1933	Collins-Lee Co.
Haddock, Dressed . . . . .	1,260	June 6, 1931	Nov. 1, 1932	Collins-Lee Co.
Haddock, Dressed . . . . .	673	June 9, 1931	Nov. 1, 1932	Collins-Lee Co.
Haddock, Dressed . . . . .	2,346	June 11, 1931	Nov. 1, 1932	Collins-Lee Co.
Haddock, Dressed . . . . .	2,507	June 26, 1931	Nov. 1, 1932	Collins-Lee Co.
Haddock, Dressed . . . . .	1,978	June 27, 1931	Nov. 1, 1932	Collins-Lee Co.
Haddock, Dressed . . . . .	200	Nov. 20, 1931	Feb. 1, 1933	Whitman, Ward & Lee Co.
Haddock Fillets . . . . .	120	Oct. 9, 1931	Dec. 9, 1932	Atlas Fish Co.
Haddock Fillets . . . . .	3,930	Nov. 24, 1931	Jan. 24, 1933	Beacon Fisheries Co.
Haddock Fillets . . . . .	3,330	Nov. 24, 1931	Jan. 24, 1933	Beacon Fisheries Co.
Haddock Fillets . . . . .	1,200	Dec. 9, 1930	Mar. 1, 1932	Collins-Lee Co.
Haddock Fillets . . . . .	210	Sept. 21, 1931	Dec. 21, 1932	Collins-Lee Co.
Haddock Fillets . . . . .	570	Nov. 23, 1931	Jan. 23, 1933	Collins-Lee Co.
Haddock Fillets . . . . .	915	Nov. 25, 1931	Jan. 1, 1933	Mills & Sons, W.
Haddock Fillets . . . . .	1,960	Nov. 7, 1931	Dec. 31, 1932	Whitman, Ward & Lee Co.
Haddock Fillets . . . . .	1,720	Nov. 10, 1931	Jan. 31, 1933	Whitman, Ward & Lee Co.
Haddock Fillets . . . . .	260	Nov. 19, 1931	Jan. 31, 1933	Whitman, Ward & Lee Co.
Haddock Fillets . . . . .	1,280	Nov. 20, 1931	Feb. 1, 1933	Whitman, Ward & Lee Co.
Haddock Fillets . . . . .	1,000	Nov. 20, 1931	Feb. 1, 1933	Whitman, Ward & Lee Co.
Haddock Fillets . . . . .	1,660	Nov. 23, 1931	Jan. 31, 1933	Whitman, Ward & Lee Co.
Hake Fillets . . . . .	90	Oct. 10, 1931	Dec. 9, 1932	Atlas Fish Co.
Halibut . . . . .	1,035	Aug. 2, 1931	Jan. 15, 1933	Burns McKeon Co.
Halibut . . . . .	1,170	June 9, 1931	Dec. 9, 1932	City Fish Market
Halibut . . . . .	2,487	May 20, 1931	Oct. 20, 1932	Coleman Son Co.
Halibut . . . . .	391	Dec. 12, 1931	Jan. 12, 1933	Lewis & Co., A. J.
Halibut . . . . .	1,700	Dec. 12, 1931	Jan. 12, 1933	Lewis & Co., A. J.
Halibut . . . . .	650	Sept. 29, 1931	Jan. 29, 1933	O'Hara & Co., F. J.
Halibut . . . . .	1,100	July 2, 1931	Oct. 2, 1932	Pier Fish Co.
Halibut . . . . .	990	Oct. 9, 1931	Jan. 9, 1933	Pier Fish Co.
Halibut . . . . .	1,215	May 14, 1931	Nov. 14, 1932	Star Fish Co.
Halibut . . . . .	2,065	Oct. 16, 1931	Jan. 16, 1933	Whitman, Ward & Lee Co.
Halibut, Medium . . . . .	138	Sept. 30, 1931	Mar. 30, 1933	Rizzo, A.
Halibut, Sliced . . . . .	500	June 13, 1931	Nov. 1, 1932	Whitman, Ward & Lee Co.
Halibut, Western . . . . .	425	Sept. 17, 1931	Dec. 17, 1932	Ocean Fish Corp.
Herring . . . . .	4,250	July 20, 1931	Jan. 20, 1933	Collins-Lee Co.
Herring . . . . .	2,000	July 27, 1931	Jan. 20, 1933	Collins-Lee Co.
Mackerel . . . . .	2,000	June 24, 1931	Dec. 31, 1932	Arnold & Winsor Co.
Mackerel . . . . .	9,000	June 19, 1931	Dec. 31, 1932	Atlantic & Pacific Fish Co.
Mackerel . . . . .	5,318	July 2, 1931	Jan. 2, 1933	Atlantic & Pacific Fish Co.
Mackerel . . . . .	9,000	July 3, 1931	Jan. 2, 1933	Atlantic & Pacific Fish Co.
Mackerel . . . . .	5,324	July 20, 1931	Jan. 2, 1933	Atlantic & Pacific Fish Co.
Mackerel . . . . .	2,557	Aug. 5, 1931	Dec. 30, 1932	Atlantic & Pacific Fish Co.
Mackerel . . . . .	4,500	Aug. 5, 1931	Dec. 30, 1932	Atlantic & Pacific Fish Co.
Mackerel . . . . .	5,000	Aug. 6, 1931	Dec. 30, 1932	Atlantic & Pacific Fish Co.
Mackerel . . . . .	7,000	Aug. 19, 1931	Dec. 30, 1932	Atlantic & Pacific Fish Co.
Mackerel . . . . .	440	Sept. 2, 1931	Dec. 2, 1932	Atlas Fish Co.
Mackerel . . . . .	1,780	July 6, 1931	Jan. 6, 1933	Boston Fish Co.
Mackerel . . . . .	2,270	Aug. 26, 1931	Feb. 1, 1933	Boston Fish Co.
Mackerel . . . . .	2,200	May 20, 1931	Nov. 20, 1932	Burns McKeon Co.
Mackerel . . . . .	3,300	May 29, 1931	Nov. 28, 1932	Burns McKeon Co.
Mackerel . . . . .	2,550	July 3, 1931	Jan. 2, 1933	Burns McKeon Co.
Mackerel . . . . .	900	Aug. 17, 1931	Jan. 15, 1933	Burns McKeon Co.
Mackerel . . . . .	5,835	Aug. 26, 1931	Jan. 1, 1933	Burns McKeon Co.

TABLE 14. — *Requests for Extension of Time Granted on Goods in Cold Storage from December 1, 1931, to December 1, 1932 — Continued*

ARTICLE	Weight (Pounds)	Placed in Storage	Extension Granted to —	Name
Mackerel . . . . .	4,025	Aug. 20, 1931	Feb. 1, 1933	Fearney & Son Co., John T.
Mackerel . . . . .	900	Aug. 24, 1931	Jan. 1, 1933	Lewis & Co., A. J.
Mackerel . . . . .	1,200	Aug. 25, 1931	Jan. 1, 1933	Lewis & Co., A. J.
Mackerel . . . . .	900	Aug. 29, 1931	Jan. 1, 1933	Lewis & Co., A. J.
Mackerel . . . . .	300	Sept. 5, 1931	Jan. 1, 1933	Lewis & Co., A. J.
Mackerel . . . . .	1,384	Sept. 11, 1931	Jan. 11, 1933	New Britain Fish Co.
Mackerel . . . . .	10,000	June 24, 1931	Dec. 31, 1932	O'Brien & Co., Inc., R.
Mackerel . . . . .	675	Sept. 5, 1931	Dec. 5, 1932	Ocean Fish Corp.
Mackerel . . . . .	750	Sept. 12, 1931	Dec. 12, 1932	Ocean Fish Corp.
Mackerel . . . . .	658	Sept. 26, 1931	Dec. 26, 1932	Ocean Fish Corp.
Mackerel . . . . .	4,132	July 20, 1931	Dec. 31, 1932	O'Donnell Co., The
Mackerel . . . . .	2,088	Aug. 24, 1931	Jan. 15, 1933	Star Fish Co.
Mackerel . . . . .	7,415	Aug. 24, 1931	Jan. 15, 1933	Star Fish Co.
Mackerel . . . . .	4,132	Aug. 24, 1931	Jan. 15, 1933	Star Fish Co.
Mackerel . . . . .	1,500	Sept. 5, 1931	Jan. 5, 1933	Star Fish Co.
Mackerel . . . . .	11,400	Aug. 20, 1931	Dec. 20, 1932	Whitman, Ward & Lee Co.
Mackerel . . . . .	2,400	Aug. 27, 1931	Dec. 27, 1932	Whitman, Ward & Lee Co.
Mackerel, Blink . . . . .	133	Aug. 28, 1931	Jan. 1, 1933	Banca Commerciale Italiana Trust Co.
Mackerel, Blink . . . . .	120	Sept. 23, 1931	Feb. 1, 1933	Banca Commerciale Italiana Trust Co.
Mackerel, Blink . . . . .	150	Oct. 7, 1931	Nov. 7, 1932	Banca Commerciale Italiana Trust Co.
Mackerel, Large . . . . .	390	Nov. 23, 1931	Jan. 1, 1933	Atlas Fish Co.
Mackerel, Large . . . . .	5,761	Aug. 26, 1931	Feb. 26, 1933	Heinicke's Market
Mackerel, Large and Med. . . . .	4,000	Aug. 22, 1931	Feb. 22, 1933	Atlantic & Pacific Fish Co.
Mackerel, Large and Med. . . . .	3,100	Aug. 27, 1931	Feb. 22, 1933	Atlantic & Pacific Fish Co.
Mackerel, Large and Med. . . . .	5,000	Aug. 27, 1931	Feb. 22, 1933	Atlantic & Pacific Fish Co.
Mackerel, Large and Med. . . . .	3,302	Aug. 28, 1931	Feb. 22, 1933	Atlantic & Pacific Fish Co.
Mackerel, Large and Med. . . . .	190	Aug. 26, 1931	Jan. 1, 1933	Banca Commerciale Italiana Trust Co.
Mackerel, Large and Med. . . . .	133	Aug. 28, 1931	Jan. 1, 1933	Banca Commerciale Italiana Trust Co.
Mackerel, Large and Med. . . . .	300	Sept. 23, 1931	Feb. 1, 1933	Banca Commerciale Italiana Trust Co.
Mackerel, Large and Med. . . . .	1,665	Aug. 27, 1931	Nov. 1, 1932	Ocean Fish Corp.
Mackerel, Spike . . . . .	300	Sept. 18, 1931	Feb. 1, 1933	Banca Commerciale Italiana Trust Co.
Mackerel, Spike . . . . .	601	Sept. 26, 1931	Feb. 1, 1933	Banca Commerciale Italiana Trust Co.
Mackerel, Spike . . . . .	1,200	Oct. 1, 1931	Nov. 1, 1932	Banca Commerciale Italiana Trust Co.
Mackerel, Spike . . . . .	450	Oct. 2, 1931	Nov. 2, 1932	Banca Commerciale Italiana Trust Co.
Mackerel, Spike . . . . .	900	Oct. 21, 1931	Nov. 21, 1932	Banca Commerciale Italiana Trust Co.
Mackerel, Tack . . . . .	450	Sept. 10, 1931	Feb. 1, 1933	Banca Commerciale Italiana Trust Co.
Mackerel, Tack . . . . .	300	Sept. 11, 1931	Feb. 1, 1933	Banca Commerciale Italiana Trust Co.
Mullets . . . . .	57	Oct. 30, 1931	Nov. 30, 1932	Banca Commerciale Italiana Trust Co.
Mullets . . . . .	1,823	Nov. 11, 1931	Jan. 11, 1933	Banca Commerciale Italiana Trust Co.
Pollock Steak . . . . .	5,385	Nov. 14, 1931	Jan. 31, 1933	Whitman, Ward & Lee Co.
Pollock Steak . . . . .	2,280	Nov. 17, 1931	Jan. 31, 1933	Whitman, Ward & Lee Co.
Pollock Steak . . . . .	1,335	Nov. 20, 1931	Feb. 1, 1933	Whitman, Ward & Lee Co.
Pollock Steak . . . . .	135	Nov. 24, 1931	Dec. 31, 1932	Whitman, Ward & Lee Co.
Salmon . . . . .	2,000	Oct. 8, 1931	Jan. 8, 1933	New England Fish Co.
Salmon . . . . .	788	Sept. 15, 1931	Jan. 15, 1933	Star Fish Co.
Salmon, Fall . . . . .	1,800	Sept. 15, 1931	Mar. 31, 1933	Tacoma Fish & Packing Co.
Salmon, Fall . . . . .	2,000	Sept. 15, 1931	Mar. 31, 1933	Tacoma Fish & Packing Co.
Salmon Fillets . . . . .	790	June 11, 1931	Nov. 1, 1932	Whitman, Ward & Lee Co.
Scup . . . . .	230	May 29, 1931	Oct. 29, 1932	Banca Commerciale Italiana Trust Co.
Scup . . . . .	135	June 16, 1931	Dec. 16, 1932	Banca Commerciale Italiana Trust Co.
Scup . . . . .	200	Aug. 20, 1931	Dec. 30, 1932	Banca Commerciale Italiana Trust Co.
Scup . . . . .	130	Aug. 20, 1931	Dec. 30, 1932	Banca Commerciale Italiana Trust Co.
Scup . . . . .	100	Nov. 23, 1931	Mar. 1, 1933	Seaconnet River Fishing Co., Inc.
Scup . . . . .	300	Nov. 30, 1931	Mar. 1, 1933	Seaconnet River Fishing Co., Inc.
Scup . . . . .	300	Dec. 7, 1931	Mar. 1, 1933	Seaconnet River Fishing Co., Inc.
Scup . . . . .	600	Dec. 10, 1931	Mar. 1, 1933	Seaconnet River Fishing Co., Inc.
Scup . . . . .	300	Dec. 12, 1931	Mar. 1, 1933	Seaconnet River Fishing Co., Inc.
Scallops, Sea . . . . .	96	Jan. 3, 1931	Mar. 31, 1932	Burns McKeon Co.
Shark . . . . .	410	Aug. 13, 1931	Jan. 31, 1933	Tribuna Magri Co.
Shark . . . . .	203	Nov. 11, 1931	Jan. 11, 1933	Tribuna Magri Co.
Shark, Dressed . . . . .	115	Oct. 8, 1931	Nov. 8, 1932	Banca Commerciale Italiana Trust Co.
Shark, Dressed . . . . .	310	Sept. 11, 1931	Jan. 11, 1933	Tribuna Magri Co.
Shark, Dressed . . . . .	725	Oct. 22, 1931	Jan. 15, 1933	Tribuna Magri Co.
Shark, Dressed . . . . .	1,755	Oct. 27, 1931	Jan. 15, 1933	Tribuna Magri Co.
Shark, Dressed . . . . .	918	Oct. 29, 1931	Jan. 15, 1933	Tribuna Magri Co.



TABLE 14. — *Requests for Extension of Time Granted on Goods in Cold Storage from December 1, 1931, to December 1, 1932 — Concluded*

ARTICLE	Weight (Pounds)	Placed in Storage	Extension Granted to —	Name
Shark, Dressed . . . . .	425	Nov. 13, 1931	Jan. 13, 1933	Tribuna Magri Co.
Shrimp . . . . .	540	Nov. 23, 1931	Jan. 23, 1933	Banca Commerciale Italiana Trust Co.
Shrimp . . . . .	105	Nov. 23, 1931	Jan. 23, 1933	Banca Commerciale Italiana Trust Co.
Skate Wings . . . . .	350	Aug. 21, 1931	Jan. 1, 1933	Banca Commerciale Italiana Trust Co.
Skate Wings . . . . .	300	Aug. 27, 1931	Jan. 1, 1933	Banca Commerciale Italiana Trust Co.
Skate Wings . . . . .	120	Aug. 28, 1931	Jan. 1, 1933	Banca Commerciale Italiana Trust Co.
Smelts . . . . .	600	Jan. 3, 1931	May 3, 1932	Busalacchi, Inc., T. & J.
Smelts . . . . .	1,805	Jan. 14, 1931	May 14, 1932	Busalacchi, Inc., T. & J.
Smelts . . . . .	2,000	Jan. 29, 1931	May 1, 1932	Coleman Son Co.
Smelts . . . . .	2,250	Jan. 29, 1931	May 1, 1932	Coleman Son Co.
Smelts . . . . .	1,260	Feb. 2, 1931	May 1, 1932	Coleman Son Co.
Smelts . . . . .	6,850	Feb. 2, 1931	May 2, 1932	Pier Fish Co.
Smelts . . . . .	132	Oct. 26, 1931	Jan. 9, 1933	Pier Fish Co.
Smelts . . . . .	1,645	Nov. 24, 1931	Jan. 24, 1933	Pier Fish Co.
Smelts . . . . .	150	Nov. 25, 1931	Jan. 24, 1933	Pier Fish Co.
Smelts . . . . .	250	Nov. 27, 1931	Jan. 24, 1933	Pier Fish Co.
Squid . . . . .	3,915	May 14, 1931	Nov. 1, 1932	Corso & Gambino Co., Inc.
Squid . . . . .	4,740	May 15, 1931	Nov. 1, 1932	Corso & Gambino Co., Inc.
Squid . . . . .	2,000	May 15, 1931	Nov. 1, 1932	Corso & Gambino Co., Inc.
Squid . . . . .	300	May 16, 1931	Nov. 1, 1932	Corso & Gambino Co., Inc.
Squid . . . . .	6,230	May 18, 1931	Nov. 1, 1932	Corso & Gambino Co., Inc.
Squid . . . . .	730	May 22, 1931	Nov. 1, 1932	Corso & Gambino Co., Inc.
Squid . . . . .	4,640	May 27, 1931	Nov. 1, 1932	Corso & Gambino Co., Inc.
Squid . . . . .	1,330	June 4, 1931	Nov. 1, 1932	Corso & Gambino Co., Inc.
Squid . . . . .	1,650	June 13, 1931	Nov. 1, 1932	Corso & Gambino Co., Inc.
Squid . . . . .	1,360	June 16, 1931	Nov. 1, 1932	Corso & Gambino Co., Inc.
Squid . . . . .	290	June 23, 1931	Nov. 1, 1932	Corso & Gambino Co., Inc.
Squid . . . . .	3,650	May 27, 1931	Nov. 26, 1932	Mantia Co., S.
Squid . . . . .	1,000	June 3, 1931	Dec. 3, 1932	Mantia Co., S.
Squid . . . . .	7,300	May 15, 1931	Sept. 15, 1932	Russo & Sons Co.
Squid . . . . .	9,600	May 20, 1931	Sept. 20, 1932	Russo & Sons Co.
Squid, Bone . . . . .	1,058	June 12, 1931	Dec. 31, 1932	Atwood & Co.
Squid, Bone . . . . .	1,922	June 12, 1931	Dec. 31, 1932	Atwood & Co.
Squid, Bone . . . . .	1,702	July 16, 1931	Dec. 16, 1932	Atwood & Co.
Squid, Bone . . . . .	5,300	May 29, 1931	*Dec. 29, 1932	Busalacchi, Inc., T. & J.
Squid, Bone . . . . .	10,000	June 1, 1931	*Jan. 1, 1933	Busalacchi, Inc., T. & J.
Squid, Bone . . . . .	900	June 2, 1931	Nov. 2, 1932	Busalacchi, Inc., T. & J.
Swordfish . . . . .	63	Sept. 9, 1931	Feb. 1, 1933	Banca Commerciale Italiana Trust Co.
Swordfish . . . . .	4,492	Sept. 8, 1931	Dec. 8, 1932	Birdseye Packing Co.
Swordfish . . . . .	416	Aug. 21, 1931	Feb. 1, 1933	Burns McKeon Co.
Swordfish . . . . .	624	Aug. 26, 1931	Feb. 1, 1933	Burns McKeon Co.
Swordfish . . . . .	1,632	Sept. 1, 1931	Jan. 1, 1933	Star Fish Co.
Swordfish, Japanese . . . . .	45,233***	Oct. 2, 1931	*Jan. 1, 1933	Atlantic & Pacific Fish Co.
Swordfish, Japanese . . . . .	1,877***	Oct. 3, 1931	July 1, 1932	Coleman Son Co.
Swordfish, Japanese . . . . .	3,571***	Oct. 3, 1931	July 1, 1932	Coleman Son Co.
Whiting . . . . .	13,442	Aug. 10, 1931	Jan. 15, 1933	Atwood & Co.
Whiting . . . . .	60,000	Sept. —, 1930	Apr. 30, 1932	Old Colony Freezer Co.
Whiting, Dressed . . . . .	624	Sept. 1, 1931	Feb. 1, 1933	Banca Commerciale Italiana Trust Co.
Whiting, Dressed . . . . .	365	Sept. 14, 1931	Feb. 1, 1933	Banca Commerciale Italiana Trust Co.
Whiting, Dressed . . . . .	700	Sept. 28, 1931	Feb. 1, 1933	Banca Commerciale Italiana Trust Co.
Whiting, Round . . . . .	100,265	Aug. 31, 1931	*Feb. 20, 1933	Gorton-Pew Fisheries Co. Ltd.
Yellow Tail Flats . . . . .	2,785	Dec. 22, 1930	Mar. 22, 1932	Hoare, William J.

\*The extension of time granted on this lot was amended before the expiration of the time to which extended. The length of time given includes the total amended period, and the weights given are the initial weights upon which extensions were asked.

\*\*Imported. Received frozen and undated.

\*\*\*Received frozen and undated.

TABLE 15. — *Requests for Extension of Time not Granted on Goods in Cold Storage from December 1, 1931, to December 1, 1932*

ARTICLE	Weight (Pounds)	Placed in Storage	Name
Butter . . . . .	3,150	Feb. 11, 1931	Holland Butter Co.
Eels, Sand . . . . .	150	June 26, 1931	Banca Commerciale Italiana Trust Co.
Mackerel . . . . .	300	June 24, 1931	Banca Commerciale Italiana Trust Co.
Mackerel . . . . .	1,525	Aug. 25, 1931	Whitman, Ward & Lee Co.
Mackerel, Tack . . . . .	270	June 16, 1931	Banca Commerciale Italiana Trust Co.
Mackerel, Tinker . . . . .	240	June 19, 1931	Banca Commerciale Italiana Trust Co.
Scup . . . . .	300	Dec. 21, 1931	Seaconnet River Fishing Co., Inc.
Squid . . . . .	268	May 22, 1931	Banca Commerciale Italiana Trust Co.
Squid . . . . .	350	June 19, 1931	Mantia Co., S.
Swordfish . . . . .	1,235	Sept. 8, 1931	Eldridge & Son, L. S.
Swordfish . . . . .	2,254	Sept. 22, 1931	Star Fish Co.

TABLE 16. — *Articles which had been in Cold Storage Longer than Twelve Months and on which no Requests for Extensions had been made, ordered removed, from December 1, 1931, to December 1, 1932*

ARTICLE	Weight (Pounds)	Placed in Storage	Name
Butter	3,100	Feb. 11, 1931	Holland Butter Co.
Eggs	270	Sept. 9, 1931	Apollo Cake Co.
Broilers	985	Sept. 6, 1931	Holland Butter Co.
Broilers	1,081	Sept. 12, 1931	Holland Butter Co.
Broilers	46	Aug. 8, 1931	Hosmer Co., F. H.
Broilers	1,588	Sept. 11, 1931	Wegener, F.
Chickens	4,100	Oct. 6, 1931	Blair's Foodland, Inc.
Chickens	553	Aug. 22, 1931	Fletcher, J. V.
Chickens	46	Nov. 24, 1930	Hicks & Shaw
Chickens	2,987	Sept. 16, 1931	Holland Butter Co.
Chickens	154	July 9, 1931	Hosmer Co., F. H.
Chickens	2,352	July 17, 1931	Hosmer Co., F. H.
Chickens	148	July 17, 1931	Hosmer Co., F. H.
Chickens	1,288	Aug. 22, 1931	Hosmer Co., F. H.
Chickens	166	Aug. 22, 1931	Hosmer Co., F. H.
Chickens	1,588	Sept. 11, 1931	Hosmer Co., F. H.
Chickens	210	Sept. 17, 1931	Sage Co., E. R.
Fowl	215	Apr. 3, 1931	Berry-Wales Co.
Fowl	990	Apr. 13, 1931	Berry-Wales Co.
Fowl	279	Dec. 9, 1930	Corwin Co., C. R.
Fowl	473	Dec. 19, 1930	Corwin Co., C. R.
Fowl	180	Jan. 31, 1931	Corwin Co., C. R.
Fowl	672	Apr. 24, 1931	Hosmer Co., F. H.
Fowl	1,344	Apr. 24, 1931	Hosmer Co., F. H.
Fowl	1,763	Apr. 24, 1931	Hosmer Co., F. H.
Fowl	1,212	Apr. 24, 1931	Hosmer Co., F. H.
Fowl	1,969	July 11, 1931	Hosmer Co., F. H.
Fowl	835	July 11, 1931	Hosmer Co., F. H.
Fowl	256	July 11, 1931	Hosmer Co., F. H.
Fowl	352	Aug. 1, 1931	Hosmer Co., F. H.
Fowl	2,700	Aug. 6, 1931	Hosmer Co., F. H.
Fowl	143	Aug. 11, 1931	Hosmer Co., F. H.
Fowl	1,463	Aug. 21, 1931	Hosmer Co., F. H.
Geese	1,116	Dec. 31, 1930	Childs, Sleeper Co.
Poultry	866	Aug. 15, 1931	Fletcher, J. V.
Turkeys	48	Mar. 14, 1931	Berry-Wales Co.
Turkeys	342	Feb. 26, 1931	Corwin Co., C. R.
Beef	500	June 30, 1931	City Beef Co.
Beef, Boneless	6,030	Mar. 5, 1931	Brighton Dressed Meat Co.
Beef Breads	50	Jan. 6, 1931	Sturtevant & Haley
Beef Livers	4,300	*Oct. 26, 1931	Bay State Provision Co.
Beef Livers	9,000	*Oct. 26, 1931	Bay State Provision Co.
Beef Ribs	812	June 19, 1931	Childs, Sleeper Co.
Beef Tenderloins	1,380	Jan. 30, 1931	Beane, H. E.
Beef Tongues	300	Mar. 19, 1931	Hartt Bros.
Oxtails	103	June 30, 1931	Glickman, M.
Oxtails	310	Oct. 22, 1931	Merchants Cafe
Sirloin Butts	109	Mar. 14, 1931	Berry-Wales Co.
Lamb Chops	128	May 18, 1931	Berry-Wales Co.
Lamb Chops	160	Nov. 22, 1930	Squaw Mt. Inn
Lamb Fores	304	May 29, 1931	Berry-Wales Co.
Pork Bellies	2,000	Feb. 28, 1931	Brighton Dressed Meat Co.
Pork Bellies	3,256	Mar. 9, 1931	Brighton Dressed Meat Co.
Pork Bellies	7,122	Mar. 20, 1931	Brighton Dressed Meat Co.
Pork Bellies	10,131	Apr. 11, 1931	Brighton Dressed Meat Co.
Pork Bellies	4,335	Apr. 11, 1931	Brighton Dressed Meat Co.
Pork Loins	444	Mar. 1, 1931	Boston Beef Co.
Pork Loins	18,071	Jan. 31, 1931	Brighton Dressed Meat Co.
Venison	50	Dec. 4, 1930	Giles, F.
Bass	50	June 4, 1931	Hale Fish Co.
Bluefish, Dressed	157	Oct. 7, 1931	Niven's Fish Market
Bluefish, Dressed	137	July 29, 1931	Whitman, Ward & Lee Co.
Bluefish, L. & M.	165	Oct. 17, 1931	Whitman, Ward & Lee Co.
Carp	315	*May 26, 1931	Bay State Smoked Fish Co.
Carp	80	Oct. 21, 1931	Katz, M.
Cod Fillets	560	Dec. 12, 1930	Beacon Fisheries Co.
Cod Fillets	180	Nov. 20, 1930	Gloucester Fresh Fish Co.
Cod Fillets	480	Nov. 24, 1930	Gloucester Fresh Fish Co.
Cod Fillets	480	Nov. 25, 1930	Gloucester Fresh Fish Co.
Cod Fillets	400	Nov. 25, 1930	Gloucester Fresh Fish Co.
Cod Fillets	2,580	Dec. 23, 1930	Gloucester Fresh Fish Co.
Cod Fillets	170	June 5, 1931	Ward Fisheries, Inc.
Cod Fillets	120	June 25, 1931	Ward Fisheries, Inc.
Eels	225	Dec. 26, 1930	Joe Tocco
Eels	370	Dec. 30, 1930	Joe Tocco
Eels, Small	467	Dec. 24, 1930	Atlas Fish Co.
Eels, Small	125	Dec. 27, 1930	Atlas Fish Co.
Eels, Small	210	Dec. 1, 1930	Covino, Joseph
Fillets	90	Oct. 23, 1931	O'Donnell Co., The
Fillets	30	Oct. 30, 1931	O'Donnell Co., The
Fillets	240	Oct. 30, 1931	O'Hara & Co., F. J.
Flounders	783	Dec. 23, 1930	Hale Fish Co.
Flounder Fillets	120	Nov. 20, 1930	Ward Fisheries, Inc.

TABLE 16. — *Articles which had been in Cold Storage Longer than Twelve Months and on which no Requests for Extensions had been made, ordered removed, from December 1, 1931, to December 1, 1932 — Concluded*

ARTICLE	Weight (Pounds)	Placed in Storage	Name
Grey Butt, L. & M.	292	Aug. 19, 1931	North Shore Market
Haddock Fillets	150	Nov. 20, 1930	Gloucester Fresh Fish Co.
Haddock Fillets	480	Nov. 21, 1930	Gloucester Fresh Fish Co.
Haddock Fillets	495	Nov. 26, 1930	Gloucester Fresh Fish Co.
Haddock Fillets	180	Jan. 31, 1931	O'Donnell Co., The
Haddock Fillets	20	Jan. 31, 1931	O'Donnell Co., The
Haddock Fillets	860	June 12, 1931	O'Hara & Co., F. J.
Haddock Fillets	243	June 10, 1931	Ward Fisheries, Inc.
Hake Fillets	1,340	Dec. 27, 1930	Cape Fish Co.
Hake Fillets	20	Sept. 26, 1931	Phillips Co., B. F.
Hake Fillets	290	June 5, 1931	Ward Fisheries, Inc.
Hake Fillets	300	June 25, 1931	Ward Fisheries, Inc.
Halibut	374	Oct. 27, 1931	Adams & Co., J.
Halibut	120	Oct. 27, 1931	O'Hara & Co., F. J.
Halibut, Sliced	2,390	July 10, 1931	Whitman, Ward & Lee Co.
Herring, Sardine	1,107	Nov. 20, 1930	Atlas Fish Co.
Herring, Sardine	840	Dec. 1, 1930	Covino, Joseph
Lobster Meat	26½	June 23, 1931	Smith & Son, J. C.
Mackerel	95	June 6, 1931	Atlas Fish Co.
Mackerel	498	Sept. 10, 1931	Hamblen Co., H. E.
Mackerel	412	Sept. 10, 1931	Niven's Fish Market
Mackerel	680	July 1, 1931	Parascondolo, N.
Mackerel	680	July 1, 1931	Sdisandolo, N.
Mackerel, L. & M.	346	Aug. 20, 1931	Boston Fish Market
Mackerel, Spike	390	June 9, 1931	Banca Commerciale Italiana Trust Co.
Mixed Fish	42	Oct. 9, 1931	Katz, M.
Pollock	2,100	June 12, 1931	Economy Fish Market
Pollock Fillets	70	Oct. 26, 1931	O'Donnell Co., The
Pollock Fillets	550	Nov. 19, 1931	O'Donnell Co., The
Pollock Fillets	4,280	Nov. 20, 1931	O'Donnell Co., The
Pollock Fillets	660	Nov. 21, 1931	O'Donnell Co., The
Pollock Fillets	120	Oct. 30, 1931	O'Hara & Co., F. J.
Pollock Fillets	140	June 5, 1931	Ward Fisheries, Inc.
Pollock Steak	50	Oct. 30, 1931	O'Donnell Co., The
Pollock Steak	2,000	Aug. 6, 1931	Potomac Fish Co.
Salmon Fillets	3,530	July 10, 1931	Whitman, Ward & Lee Co.
Scallops	176	Apr. 22, 1931	Kimball Lobster Shop
Scallops, Bay	920	Oct. 4, 1930	Eldridge & Son, L. S.
Scallops, Bay	560	Oct. 6, 1930	Eldridge & Son, L. S.
Scallops, Bay	240	Oct. 9, 1930	Eldridge & Son, L. S.
Scallops, Bay	200	Oct. 10, 1930	Eldridge & Son, L. S.
Scallops, Bay	120	Oct. 11, 1930	Eldridge & Son, L. S.
Scallops, Bay	200	Oct. 15, 1930	Eldridge & Son, L. S.
Scallops, Bay	120	Oct. 22, 1930	Eldridge & Son, L. S.
Scallops, Bay	1,560	Nov. 17, 1930	Eldridge & Son, L. S.
Scallops, Sea	720	May 18, 1931	O'Neil & Hoffner
Scallops, Sea	625	Sept. 18, 1931	Prior & Townsend, Inc.
Scup	400	June 5, 1931	Banca Commerciale Italiana Trust Co.
Scup	382	July 27, 1931	Tallman & Mack
Sepia	80	Nov. 27, 1930	Rowe & Sullivan
Shad	600	*Dec. 31, 1931	Bay State Smoked Fish Co.
Shrimp	415	Oct. 7, 1931	Mantia Co., S.
Shrimp	100	Oct. 7, 1931	Mantia Co., S.
Shrimp	300	Oct. 21, 1931	Mantia Co., S.
Shrimp	600	Oct. 29, 1931	Mantia Co., S.
Shrimp	250	Oct. 31, 1931	Mantia Co., S.
Shrimp	1,000	Nov. 6, 1931	Mantia Co., S.
Smelts	1,080	Jan. 14, 1931	Corso & Gambino Co., Inc.
Smelts	2,040	Jan. 14, 1931	Corso & Gambino Co., Inc.
Squid	850	Oct. 31, 1931	Mantia Co., S.
Squid	1,200	Sept. 11, 1931	Mantia Co., S.
Squid, Bone	608	June 5, 1931	Banca Commerciale Italiana Trust Co.
Squid, Bone	352	June 13, 1931	Banca Commerciale Italiana Trust Co.
Swordfish	375	Aug. 19, 1931	Masse, L. A.
Whiting	687	Aug. 21, 1931	O'Donnell Co., The
Whiting	810	Oct. 8, 1931	O'Donnell Co., The

\*Received frozen and undated.



TABLE 17. — *Confiscations*

IN WAREHOUSES					
	Pounds			Pounds	
Ducks . . . . .	125	Decomposed	Mackerel . . . . .	300	Decomposed
Fowl . . . . .	908	"	Mackerel, Blink . . . . .	100	"
Beef, Boneless . . . . .	386	"	Mackerel, Blink . . . . .	150	"
Beef, Boneless . . . . .	135	"	Mackerel, L. & M. . . . .	267	"
Lamb Fores . . . . .	132	"	Mackerel, L. & M. . . . .	130	"
Pork Loins . . . . .	280	"	Mackerel, L. & M. . . . .	250	"
Pork Loins . . . . .	409	"	Mackerel, L. & M. . . . .	105	"
Butterfish . . . . .	60	"	Mackerel, L. & M. . . . .	250	"
Butterfish . . . . .	475	"	Mullets . . . . .	100	"
Fresh Fillets . . . . .	30	"	Scup . . . . .	220	"
Haddock Fillets . . . . .	90	"	Scup . . . . .	300	"
Halibut, Chicken . . . . .	180	"	Scup . . . . .	118	"
Mackerel . . . . .	600	"	Sole, Lemon . . . . .	1,750	"

## IN SLAUGHTERHOUSES

	Pounds	
Beef . . . . .	500	Septicæmia
Beef . . . . .	400	"
Pork . . . . .	300	Hog Cholera
Veal . . . . .	30	Immature and Unstamped

## IN STORES, MARKETS, ETC.

	Pounds	
Chicken . . . . .	25	Decomposed
Turkey . . . . .	18	"
Turkey . . . . .	23	"
Beef . . . . .	40	"
Tongues, Pickled Lambs . . . . .	10	"
Haddock . . . . .	20	"
<i>Total pounds confiscated</i>		9,216

TABLE 18. — *Summary of Slaughtering Inspections from December 1, 1931, through November 30, 1932*

Total number of carcasses inspected	200,851	Total number of carcasses condemned	2,847
Cattle . . . . .	32,782	Cattle . . . . .	656
Calves . . . . .	93,042	Calves . . . . .	1,707
Hogs . . . . .	64,860	Hogs . . . . .	462
Sheep . . . . .	10,167	Sheep . . . . .	22

REASON FOR CONDEMNATION	Cattle	Calves	Hogs	Sheep	Totals
Immaturity . . . . .	—	1,564	—	—	1,564
Tuberculosis . . . . .	583	15	125	6	729
Cholera . . . . .	—	—	203	—	203
Pneumonia . . . . .	5	3	66	—	74
Died otherwise than by slaughter . . . . .	1	58	7	2	68
Injured . . . . .	17	22	15	6	60
Emaciated . . . . .	6	8	8	6	28
Septicæmia . . . . .	14	1	10	1	26
Navel ill . . . . .	1	14	—	—	15
Scours . . . . .	—	11	1	—	12
Tumor . . . . .	—	2	8	—	10
Abscesses . . . . .	4	—	3	—	7
Milk fever . . . . .	5	—	1	—	6
Urticaria . . . . .	—	—	5	—	5
Peritonitis . . . . .	4	—	1	—	5
Icterus . . . . .	—	2	2	—	4
Edema . . . . .	4	—	—	—	4
Enteritis . . . . .	—	3	—	1	4
Pyemia . . . . .	1	—	2	—	3
Traumatism . . . . .	3	—	—	—	3
Premature . . . . .	—	3	—	—	3
Sexual odor . . . . .	—	—	2	—	2
Metritis . . . . .	2	—	—	—	2
Fever . . . . .	2	—	—	—	2
Slaughtered illegally . . . . .	—	—	1	—	1
Rheumatism . . . . .	—	—	1	—	1
Tape worm cyst . . . . .	—	—	1	—	1
Mastitis . . . . .	1	—	—	—	1
Kidney disease . . . . .	1	—	—	—	1
Ascites . . . . .	1	—	—	—	1
Indigestion . . . . .	1	—	—	—	1
Paralysis . . . . .	—	1	—	—	1
Totals . . . . .	656	1,707	462	22	2,847

## REPORT OF THE DIVISION OF SANITARY ENGINEERING

ARTHUR D. WESTON, *Director and Chief Engineer*

### OVERSIGHT AND CARE OF INLAND WATERS

#### *Water Supply and Sewerage*

During the year 1932 the Engineering Division investigated 502 applications calling for the advice of the Department. Of this number 352 related to matters of water supply, 24 to sewerage and sewage disposal, 24 to pollution of streams, 7 to ice supplies and 95 to miscellaneous matters. This is the smallest number of applications received by this Division since 1929 and about 18% less than the number received during the year 1931.

The number of cities and towns having water supplies is 238\*, the same as that shown in the report of 1931 since no new water supplies were introduced in the State during the year.

The average rainfall in the State for the year ending December 31, 1932, as recorded at eight long-term stations located in different parts of the State, was 46.71 inches or 2.24 inches above the normal. There was a deficiency in rainfall in February, April, May, June, July and December. The rainfall in August was about normal, while during January, March, September, October and November it was considerably in excess of the normal. As a result of the heavy rainfall in August, September, October and November, dangerous conditions affecting water supplies existed in certain towns in the westerly and central parts of the State where the storage available was inadequate to properly purify the water. As a result of these conditions the necessary equipment was installed for chlorinating the water supplied by these municipalities.

#### *Examination of Camps and Roadside Stands*

Very few examinations were made in connection with water supplies and sewage disposal works at recreation camps and wayside stands during the past year and such examinations as were made were by request of the camp owners or the local authorities. The limited appropriations available to the Department made it impracticable to carry out extensive investigations in this regard. Of the 31 camps examined during the past year, 11 were found to have reasonably satisfactory water supplies.

#### *Construction Work at State Institutions*

During the year 1932 construction activities at State institutions so far as they relate to water supply, sewerage and fire protection were limited to:

1. The construction of a new valve house and the installation of a sand chamber and suction main in connection with the tubular well system at the Westfield State Sanatorium.
2. Certain reconstruction work at the sewage filtration plant of the Pondville Hospital and the installation of a new pump and connecting piping to the well used as a source of water supply at this hospital, this latter work having been made necessary by the breaking down of the old pumping machinery.
3. The construction of new sewage disposal works at the North Reading State Sanatorium and the reconstruction of the old sewage beds at this institution, together with considerable work in connection with separating storm water from the sanitary sewers.
4. The extension of the fire service at the Lakeville State Sanatorium by a connection near the power house to the domestic supply main which supplies the farm building group, thus providing pump pressure at the hydrants in the vicinity of the barns.

All of the work at the North Reading State Sanatorium was carried out by day

\*Includes several smaller towns supplied only in part by water companies, industrial plants, or from other towns.

labor, the unemployed in the municipalities in the vicinity of the hospital being utilized so far as practicable. The cost of these various projects was as follows:

Institution	Project	Authorization	Appropriation	Expended
Westfield State Sanatorium	Reconstruction of valve house, installation of sand chamber and suction main	Acts 1932, Chap. 170, Item 556	\$1,500	\$1,476 43
Pondville Hospital	Installation of new pump, sand chamber and connecting piping	Transferred from maintenance	\$1,550	\$1,030 80
Pondville Hospital	New filter beds	Acts 1931, Chap. 245, Item 577A	\$10,000	\$246 68 <sup>1</sup>
North Reading State Sanatorium	Construction of new sewage disposal works and reconstruction of old filter beds	Acts 1932, Chap. 69, Item H	\$17,000	\$7,458 75 <sup>2</sup>
Lakeville State Sanatorium	Extending Fire Service Supply	Acts 1929, Chap. 146, Item 587 Acts 1930, Chap. 115, Item 632 Acts 1928, Chap. 127, Item 590	\$17,700	\$16,575 09 \$17,201 02 <sup>3</sup> \$498 02 <sup>2</sup>

<sup>1</sup> 1931.      <sup>2</sup> 1932.      <sup>3</sup> 1930-1931.

*Metropolitan Water Supply  
Diversion of Water from the Ware River*

During the past year 9597.9 million gallons of water were diverted through the new diversion works and tunnel constructed for the purpose of discharging the flood water of the Ware River at Coldbrook into Wachusett Reservoir. Diversions through these works occurred as follows:

Jan. 7 to 31	. . . . .	2228.1 million gallons
Feb. 1 to 22	. . . . .	576.4 " "
Mar. 3 to 13, 23 to 31	. . . . .	924.3 " "
Apr. 1 to 30	. . . . .	5570.6 " "
May 1 to 11	. . . . .	169.5 " "
Oct. 19	. . . . .	129.0 " "

On May 9 Wachusett Reservoir reached the elevation of 394.39. This is the highest elevation for 3 years and represents a total storage of 64,147.8 million gallons, 7336.2 million gallons, or 12.9 per cent, in excess of that in storage at any time during the previous year. Approval was granted by this Department for the diversion of the water of this river between May 31 and December 1, as provided for in Chapter 375 of the Acts of the year 1926.

Legislation enacted during the year, Chapter 262, Acts of 1932, permits the Metropolitan District Water Supply Commission to construct works for the diversion of sewage and other polluting matter from within the watershed of the Ware and Quinapoxet rivers, but up to the end of the year no works had been constructed. These watersheds continue to be polluted, especially from a manufacturing plant in Holden and hospitals in Rutland and the Rutland Prison Camp.

SANITARY PROTECTION OF PUBLIC WATER SUPPLIES

During the year 1932 rules and regulations were adopted by the Department, in accordance with Section 160 of Chapter 111 of the General Laws, for the purpose of preventing the pollution and securing the sanitary protection of the waters used as sources of public water supply by the Colrain Fire District Number One, South Deerfield Water Supply District, South Egremont Water Company, and the city of New Bedford. In addition, rules and regulations were readopted in connection with the sources of water supply of the city of Taunton as certain changes in the control of the sources of water supply of that city brought about by Chapter 400 of the Acts of 1924 reduced the effectiveness of the rules adopted on June 14, 1902.



The cities, towns and fire and water districts for which rules and regulations have been adopted are as follows:

Abington and Rockland . . . . .	1927	Lincoln and Concord . . . . .	1903
Adams (Fire District) . . . . .	1921	Lynn . . . . .	1907
Amherst (Water Company) . . . . .	1931	Marlborough . . . . .	1901
Andover . . . . .	1908	Maynard . . . . .	1907
Ashburnham . . . . .	1922	Medfield (State Hospital) . . . . .	1922
Ashfield (Water Company) . . . . .	1923	Metropolitan Water District . . . . .	1925
Attleboro . . . . .	1926	Milford (Water Company) . . . . .	1924
Braintree . . . . .	1913, 1926	Montague (Turners Falls Fire District) . . . . .	1908
Brockton . . . . .	1905	New Bedford . . . . .	1932
Cambridge . . . . .	1899	Newburyport . . . . .	1921
Chester . . . . .	1914	Norfolk (State Hospital) . . . . .	1926
Chicopee . . . . .	1906	Northampton . . . . .	1904
Cohasset (Water Company) . . . . .	1923	North Andover . . . . .	1912
Colrain (Fire District) . . . . .	1932	Northborough . . . . .	1905
Concord . . . . .	1910	Norwood . . . . .	1901
Dalton (Fire District) . . . . .	1919	Peabody . . . . .	1922
Danvers and Middleton . . . . .	1920	Pittsfield . . . . .	1903, 1909
Deerfield (So. Deerfield Water Supply District) . . . . .	1932	Plymouth . . . . .	1908
Easthampton . . . . .	1904	Randolph and Holbrook . . . . .	1926
Egremont (So. Egremont Water Company) . . . . .	1932	Rockport . . . . .	1902
Fall River . . . . .	1907	Russell . . . . .	1910
Falmouth . . . . .	1930	Rutland . . . . .	1914
Fitchburg . . . . .	1903, 1907, 1918	Salem and Beverly . . . . .	1901
Gardner . . . . .	1910	Scituate . . . . .	1927
Gloucester . . . . .	1930	Southbridge (Southbridge Water Supply Company) . . . . .	1931
Great Barrington (Housatonic Water Works Company) . . . . .	1929	Springfield . . . . .	1904, 1910
Greenfield . . . . .	1904	Stockbridge (Water Company) . . . . .	1910
Haverhill . . . . .	1921	Taunton . . . . .	1932
Hingham and Hull (Hingham Water Company) . . . . .	1912	Wakefield . . . . .	1904
Holden . . . . .	1914	Westborough . . . . .	1929
Holyoke . . . . .	1908, 1918	Westfield . . . . .	1922
Hudson . . . . .	1929	West Springfield . . . . .	1907
Lakeville (State Sanatorium) . . . . .	1926	Weymouth . . . . .	1903
Lee (Berkshire Water Company) . . . . .	1919	Williamsburg . . . . .	1914
Leicester (Cherry Valley and Rochdale Water District) . . . . .	1914	Winchester . . . . .	1909
		Worcester . . . . .	1926

## EXAMINATION OF PUBLIC WATER SUPPLIES

A larger number of the public water supplies have been examined by the engineers of this office during the past year than has been the practice for a number of years. Such examinations were deemed necessary because of the danger of some of these supplies having become polluted by persons visiting the watersheds, more especially those employed on the watersheds for clearing of land, cutting of brush, etc., in the relief of unemployment. The regular samples were collected for chemical analysis and microscopical examination, and in addition a larger number of samples than in previous years were collected for bacterial examination in connection with these supplies.

The following are the average results of chemical analyses of samples of water collected from the sources of public water supply during the year 1932:

*Analyses of the Water of Public Water Supplies*  
*Averages of Chemical Analyses of Surface-Water Sources for the Year 1932*

[Parts per Million]

CITY OR TOWN	SOURCE	Color	Residue on Evaporation	AMMONIA			Chlorine	Hardness
				Free	ALBUMINOID Total	Sus- pended		
Metropolitan Water District	Wachusett Reservoir, upper end	22	38.7	.012	.103	.025	2.5	14
	Wachusett Reservoir, lower end	12	36.2	.015	.099	.029	2.5	14
	Sudbury Reservoir	12	42.1	.015	.112	.037	3.0	18
	Framingham Reservoir No. 3	14	41.2	.030	.128	.037	3.2	18
	Hopkinton Reservoir	42	40.0	.011	.146	.041	3.0	12
	Ashland Reservoir	49	48.8	.011	.165	.033	4.4	15
	Framingham Reservoir No. 2	63	63.3	.033	.179	.057	6.5	20
	Lake Cochituate	11	85.2	.087	.141	.032	9.8	35
	Chestnut Hill Reservoir	14	44.0	.057	.099	.029	4.1	19
	Weston Reservoir	12	40.2	.011	.099	.027	3.3	17
	Spot Pond	6	42.6	.023	.104	.038	3.9	16
	Tap in State House	12	43.5	.007	.100	.027	3.9	16
	Tap in Revere	7	40.7	.009	.067	.021	3.6	19
	Tap in Quincy	8	43.6	.004	.057	.016	4.0	20
	Big Sandy Pond	8	35.2	.008	.104	.031	7.4	8
	Dry Brook	8	75.7	.009	.034	.009	1.3	59
	Bassett Brook	1	43.0	.004	.028	.009	1.1	31
	Amethyst Brook large reservoir	30	35.4	.003	.095	.034	2.0	11
	Amethyst Brook small reservoir	10	34.2	.005	.100	.051	1.9	11
Andover	Haggett's Pond	7	50.0	.016	.115	.025	5.2	21
Ashburnham	Upper Naukeag Lake	2	22.4	.015	.048	.017	1.6	6
Ashfield	Bear Swamp Brook	32	53.0	.004	.088	.019	1.6	35
Athol	Phillipston Reservoir	34	43.5	.042	.189	.066	2.2	14
	Buckman Brook Reservoir	13	33.7	.018	.101	.047	1.7	9
	Thousand Acre Meadow Brook	149	72.6	.044	.274	.100	2.3	20
	Inlet of filter	15	31.1	.022	.115	.038	1.3	12
Barre	Outlet of filter	15	37.3	.012	.092	.034	1.4	11
Blackstone	Reservoir	14	37.3	.007	.129	.041	2.2	20
Blandford (Fire Dist.)	Tap (supply from Woonsocket, R. I.)	40	43.5	.007	.125	.043	3.6	15
	Freeland Brook	3	32.5	.003	.026	.009	2.3	12
	Silver Lake	6	35.2	.011	.098	.034	6.0	7
	Cooley Hill Reservoir	6	34.6	.022	.141	.048	2.3	9
CAMBRIDGE	Lower Hobbs Brook Reservoir	8	59.2	.023	.155	.033	5.4	27
	Upper Hobbs Brook Reservoir	21	67.0	.039	.188	.043	5.5	27
	Stony Brook Reservoir	33	75.6	.023	.163	.038	6.9	31
	Fresh Pond	6	101.7	.053	.135	.033	8.5	55
Cheshire	Thunder Brook	0	69.3	.009	.022	.011	1.2	55
	Kitchen Brook	1	52.7	.009	.020	.009	1.3	41
Chester *	Austin Brook Reservoir	11	39.4	.007	.083	.030	1.5	19
	Horn Pond	10	39.6	.015	.144	.037	1.3	18
CHICOPÉE	Morton Brook	4	54.2	.007	.024	.011	3.2	19
	Cooley Brook	33	50.4	.078	.116	.047	2.1	19
Clinton	Tap in town	11	41.5	.005	.101	.036	2.3	15
Colrain (Griswoldville)	McClellan Reservoir	3	67.0	.006	.026	.012	1.0	47
Colrain (Fire District No. 1)	Mountain Brook Reservoir	2	89.5	.003	.023	.008	1.3	72
Concord	Nagog Pond	2	35.7	.010	.109	.028	4.4	10
Dalton (Fire District)	Egypt Brook Reservoir	21	29.5	.008	.071	.019	1.2	12
	Windsor Reservoir	32	53.5	.042	.144	.046	1.2	29
	Cady Brook	20	48.9	.007	.094	.026	1.2	27
Danvers	Middleton Pond	40	47.9	.017	.176	.048	4.5	18
	Swan Pond	21	45.4	.022	.186	.047	4.4	19
Deerfield (South Deerfield Water Supply District)	Roaring Brook	6	63.9	.001	.041	.018	1.5	41
Egremont (South)	Goodale Brook	0	45.7	.002	.012	.006	1.2	29

\*Chester Fire District taken over by town Feb. 1, 1932

## Averages of Chemical Analyses of Surface-Water Sources, etc.—Continued

[Parts per Million]

CITY OR TOWN	SOURCE	Color	Residue on Evaporation	AMMONIA			Chlorine	Hardness
				Free	ALBUMINOID			
					Total	Sus- pended		
FALL RIVER . . .	North Watuppa Lake . . .	6	37.4	.017	.114	.033	5.7	10
Falmouth . . .	Long Pond . . .	1	35.0	.008	.087	.018	10.5	5
FITCHBURG . . .	Meetinghouse Pond . . .	5	31.7	.019	.132	.034	2.2	9
	Scott Reservoir . . .	8	31.6	.038	.133	.035	2.0	8
	Wachusett Lake . . .	4	26.6	.034	.114	.028	1.8	8
	Falulah Brook . . .	13	28.7	.015	.088	.023	1.8	6
	Ashby Reservoir . . .	21	26.5	.058	.144	.042	1.8	6
GARDNER . . .	Crystal Lake . . .	4	47.0	.008	.109	.034	3.2	21
GLOUCESTER . . .	Dike's Brook Reservoir . . .	28	43.5	.023	.123	.029	9.2	6
	Wallace Reservoir . . .	35	48.3	.011	.145	.037	10.5	9
	Haskell Brook Reservoir . . .	8	40.2	.006	.078	.021	8.0	6
Great Barrington (Fire District) . . .	East Mountain Reservoir . . .	7	56.5	.011	.067	.015	1.4	41
Great Barrington (Housatonic) . . .	Long Pond . . .	3	77.0	.005	.144	.030	1.5	75
Greenfield . . .	Glen Brook Upper Reservoir . . .	6	52.7	.016	.101	.051	1.6	34
	Glen Brook Lower Reservoir . . .	5	51.1	.008	.094	.044	1.7	33
Hadley (Water Supply District) . . .	Hart's Brook Reservoir . . .	9	42.5	.003	.055	.022	1.7	18
Hatfield . . .	Running Gutter Brook Reservoir . . .	7	72.3	.003	.025	.007	2.2	36
HAVERHILL . . .	Johnson's Pond . . .	14	54.5	.019	.157	.053	5.1	26
	Crystal Lake . . .	12	37.3	.007	.112	.033	3.9	16
	Kenoza Lake . . .	11	49.5	.007	.123	.043	4.6	24
	Lake Saltonstall . . .	5	68.5	.022	.212	.070	6.7	32
	Pentucket Lake . . .	7	50.4	.018	.152	.043	4.6	22
	Millvale Reservoir . . .	45	57.0	.013	.169	.061	4.8	23
Hingham . . .	Accord Pond . . .	11	37.1	.010	.103	.028	6.7	11
Hinsdale (Fire District) . . .	Fulling Mill Pond . . .	29	57.3	.048	.211	.057	7.6	19
HOLYOKE . . .	Reservoir . . .	0	25.0	.007	.016	.007	1.2	9
	Whiting Street Reservoir . . .	7	54.4	.028	.121	.037	2.0	30
	Fomer Reservoir . . .	25	36.1	.020	.124	.036	1.4	14
	Wright and Ashley Pond . . .	9	52.6	.022	.160	.053	1.7	25
	High Service Reservoir . . .	6	37.1	.013	.120	.031	1.5	18
	White Reservoir . . .	16	36.7	.015	.111	.028	1.4	17
	Gates Pond . . .	5	34.0	.021	.104	.033	2.3	15
Hudson . . .								
Huntington (Fire District) . . .	Cold Brook Reservoir . . .	11	39.1	.005	.035	.010	1.6	18
Ipswich . . .	Dow's Brook Reservoir . . .	25	55.0	.024	.125	.026	8.1	21
	Bull Brook . . .	92	70.9	.042	.169	.040	8.1	27
LAWRENCE . . .	Merrimack River, filtered . . .	38	53.0	.056	.098	-	5.6	16
Lee . . .	Codding Brook Upper Reservoir . . .	4	48.5	.005	.039	.013	1.2	33
	Codding Brook Lower Reservoir . . .	3	46.4	.004	.036	.007	1.2	33
	Basin Pond Brook . . .	41	43.3	.017	.100	.021	1.2	17
Lenox . . .	Lower Root Reservoir . . .	3	76.4	.004	.042	.016	1.1	65
	Woolsey Reservoir . . .	5	69.2	.004	.033	.011	1.1	48
LEOMINSTER . . .	Morse Reservoir . . .	12	25.1	.035	.084	.027	1.6	6
	Haynes Reservoir . . .	11	26.9	.066	.150	.046	1.8	7
	Fall Brook Reservoir . . .	10	27.4	.048	.096	.028	1.6	7
	No-Town Reservoir . . .	37	32.2	.135	.181	.060	1.6	9
Lincoln . . .	Sandy Pond . . .	2	34.0	.005	.095	.020	3.3	11
LYNN . . .	Birch Reservoir . . .	19	65.9	.035	.178	.037	8.5	28
	Breed's Reservoir . . .	19	63.0	.030	.151	.036	8.0	27
	Walden Reservoir . . .	41	69.8	.048	.185	.036	8.2	31
	Hawkes Reservoir . . .	42	71.2	.042	.199	.049	8.4	32
Manchester . . .	Gravel Pond . . .	9	40.9	.006	.084	.018	8.2	13
MARLBOROUGH . . .	Lake Williams . . .	3	59.1	.012	.170	.053	6.9	24
	Millham Brook Reservoir . . .	34	56.5	.030	.133	.035	4.9	22
Maynard . . .	White Pond . . .	8	29.3	.007	.100	.036	2.5	9
Milford . . .	Charles River, filtered . . .	15	47.2	.004	.029	-	3.4	25
Montague . . .	Lake Pleasant . . .	4	26.8	.034	.079	.029	1.5	9
NEW BEDFORD . . .	Little Quittacas Pond . . .	20	41.6	.013	.145	.037	5.2	11
	Great Quittacas Pond . . .	34	39.0	.010	.141	.030	5.3	10
NEWBURYPORT . . .	Artichoke River . . .	28	74.5	.078	.290	.100	7.3	27
NORTH ADAMS . . .	Notch Brook Reservoir . . .	4	74.0	.007	.028	.009	1.0	67
	Broad Brook . . .	11	35.9	.028	.062	.025	1.0	20
	Mount Williams Reservoir . . .	2	72.3	.010	.049	.014	1.1	64
NORTHAMPTON . . .	Middle Reservoir . . .	22	42.2	.009	.108	.042	1.5	20
	Mountain Street Reservoir . . .	3	39.3	.011	.074	.032	1.4	20
North Andover . . .	Great Pond . . .	6	51.5	.011	.130	.028	5.2	21
Northborough . . .	Lower Reservoir . . .	59	48.3	.068	.166	.054	2.7	14
	Upper Reservoir . . .	94	54.6	.065	.195	.052	3.2	15
North Brookfield . . .	Doane Pond . . .	23	35.2	.032	.197	.060	2.3	8
	North Pond . . .	27	34.5	.029	.192	.051	2.1	9
Northfield . . .	Minot Brook Reservoir . . .	9	43.0	.002	.030	.008	1.8	14
Norwood . . .	Buckmaster Pond . . .	7	53.0	.043	.169	.064	6.5	20
Orange . . .	Reservoir . . .	34	38.8	.018	.063	.021	2.1	9
Palmer (Fire District No. 1) . . .								
	Lower Reservoir . . .	18	34.8	.016	.131	.046	2.2	11
	Upper Reservoir . . .	15	35.4	.013	.162	.051	2.4	10



## Averages of Chemical Analyses of Surface-Water Sources, etc.—Concluded

[Parts per Million]

CITY OR TOWN	SOURCE	Color	Residue on Evaporation	AMMONIA			Chlorine	Hardness
				Free	ALBUMINOID			
					Total	Sus- pended		
PEABODY . . .	Spring Pond	10	59.2	.038	.130	.041	8.3	25
PITTSFIELD . . .	Suntaug Lake	34	64.6	.050	.171	.046	8.2	24
	Ashley Lake	10	52.2	.034	.086	.025	1.3	35
	Ashley Brook	11	61.0	.027	.084	.030	1.4	45
	Hathaway Brook	9	74.6	.012	.056	.023	1.3	67
	Mill Brook	33	39.7	.054	.166	.043	1.2	17
Plymouth . . .	Sacket Brook	9	66.0	.008	.054	.021	1.2	51
	Farnham Reservoir	47	41.4	.074	.181	.048	1.2	16
	Little South Pond	2	26.5	.025	.111	.035	6.5	4
Randolph . . .	Great South Pond	1	27.0	.017	.086	.028	6.4	4
	Great Pond	33	57.2	.015	.139	.035	8.7	17
Rockport . . .	Cape Pond	31	103.4	.052	.253	.116	31.5	22
Russell . . .	Black Brook	20	39.1	.004	.057	.018	1.6	15
Rutland . . .	Muschopauge Lake	1	48.0	.007	.080	.022	3.1	22
SALEM . . .	Wenham Lake	38	76.6	.095	.160	.039	9.6	29
	Longham Reservoir	78	80.1	.053	.252	.089	10.8	26
	Ipswich River at pumping station	74	142.6	.116	.222	.054	8.4	64
Shelburne (Shelburne Falls Fire District)	Fox Brook	8	59.2	.001	.035	.016	1.2	39
Southbridge . . .	Hatchet Brook Reservoir No. 3	14	29.8	.031	.114	.035	2.1	8
	Hatchet Brook Reservoir No. 4	17	29.9	.041	.127	.036	2.2	8
South Hadley (Fire District No. 1)	Leaping Well Reservoir	3	28.0	.012	.090	.044	2.3	10
	Buttery Brook Reservoir	8	41.9	.022	.081	.033	3.3	16
Spencer . . .	Shaw Pond	6	24.3	.005	.106	.031	2.1	6
SPRINGFIELD . . .	Westfield Little River, filtered	8	41.4	.005	.044	-	1.5	16
Stockbridge . . .	Lake Averic	11	65.0	.012	.120	.028	1.4	50
Stoughton . . .	Muddy Pond Brook	49	49.0	.024	.074	.020	3.9	12
TAUNTON . . .	Assawompsett Pond	24	39.9	.022	.134	.031	4.9	8
	Elder's Pond	6	35.1	.009	.117	.027	4.9	8
Wakefield . . .	Crystal Lake, filtered	7	80.4	.003	.082	-	9.4	35
Wareham (Onset)	Jonathan Pond	2	25.5	.011	.097	.026	6.0	5
WESTFIELD . . .	Montgomery Reservoir	27	27.4	.044	.105	.030	1.4	6
	Tillotson Brook Reservoir	8	34.2	.075	.074	.029	1.5	10
	Granville Reservoir	12	32.1	.048	.078	.028	1.6	8
	Bear Hole Brook	8	73.1	.022	.056	.023	2.0	46
West Springfield . . .	Bear Hole Brook, filtered	3	71.0	.001	.012	-	1.9	47
	East Mountain Reservoir	9	55.2	.002	.029	.013	1.7	30
West Stockbridge . . .	Great Pond	33	42.3	.022	.126	.032	5.5	10
Weymouth . . .	Reservoir	12	44.2	.003	.059	.023	1.9	24
Williamsburg . . .	Rattlesnake Brook	3	92.5	.004	.023	.013	0.9	85
	Paul Brook	1	55.3	.007	.031	.015	1.1	40
	North Reservoir	4	43.6	.014	.087	.023	4.6	20
Winchester . . .	South Reservoir	4	38.9	.013	.085	.023	4.3	18
	Middle Reservoir	9	37.9	.019	.155	.042	4.2	16
WORCESTER . . .	Bottomly Reservoir	24	60.2	.043	.151	.032	3.0	25
	Kent Reservoir	8	43.0	.026	.124	.037	2.9	20
	Leicester Reservoir	10	40.2	.025	.120	.039	2.5	16
	Mann Reservoir	12	40.4	.013	.116	.034	2.5	19
	Upper Holden Reservoir	10	36.2	.008	.110	.040	2.2	9
	Lower Holden Reservoir	9	31.8	.007	.096	.037	2.2	12
	Kendall Reservoir	7	30.2	.026	.129	.060	2.2	12
	Pine Hill Reservoir	16	39.1	.077	.126	.031	2.7	16

## Averages of Chemical Analyses of Ground-Water Sources for the Year 1932

[Parts per Million]

CITY OR TOWN	Source	Color	Residue on Evaporation	AMMONIA		Chlorine	NITROGEN AS —		Hardness	Iron
				Free	Albuminoid		Nitrates	Nitrites		
Acton (West and South Water Supply District)	Tubular wells	1	88.4	.000	.005	6.1	1.140	.000	41	.06
Adams (Fire District)	Tubular wells	0	155.0	.000	.006	1.3	.500	.000	131	.07
Amesbury	Tubular wells	5	158.0	.087	.018	5.3	.027	.002	81	7.57
	Tubular wells, filtered	0	143.2	.005	.013	5.2	.020	.000	81	.08
Ashland	Tubular wells, new supply	1	56.3	.003	.017	4.8	.145	.000	26	.09
ATTLEBORO	Wells	0	53.6	.004	.023	5.1	.062	.000	27	.13
	Wells near Wad- ing River	10	50.9	.025	.019	4.1	.028	.000	21	.95
Auburn	Tubular wells	0	98.7	.000	.005	7.3	1.700	.000	47	.07
Avon	Wells	1	95.6	.001	.011	7.1	2.650	.001	40	.10
Ayer	Large well	2	84.5	.002	.008	8.4	1.255	.000	37	.15
	Tubular wells	2	76.7	.003	.007	4.6	.056	.000	40	.31
Barnstable	Tubular wells	1	39.3	.007	.007	10.5	.030	.000	6	.32
Bedford	Large well	1	65.2	.005	.017	5.6	.287	.000	26	.19
Belchertown	Tubular wells	0	69.0	.001	.005	3.5	.047	.000	31	.09
Billerica	New large wells	18	79.0	.086	.085	9.1	.079	.002	23	.30
Bourne (Monument Beach)	Wells	0	36.0	.000	.006	10.2	.425	.001	13	.08
Bridgewater	Wells	0	62.0	.003	.005	6.2	1.100	.000	18	.08
Brookline	Tubular wells and filter-gallery, filtered	6	96.0	.003	.044	8.0	.258	.000	46	.08
Canton	Springdale well	4	70.7	.004	.014	6.6	.500	.000	32	.09
	Well near Henry's Spring	3	71.2	.002	.012	7.2	.925	.000	28	.09
	Ward well	7	79.2	.004	.021	6.5	.400	.000	34	.09
Chatham	Filter-gallery	3	51.7	.008	.023	18.4	.020	.000	9	.24
Chelmsford (North Chelmsford Fire District)	Tubular wells	14	59.0	.127	.063	4.5	.248	.001	23	.40
Chelmsford (Water District)	Tubular wells	0	86.2	.002	.008	5.7	.800	.002	36	.18
Cohasset	Tubular wells	3	151.3	.001	.033	19.4	1.767	.000	63	.06
	Dug well, filtered	7	82.0	.018	.070	10.4	.020	.000	25	.10
Cummington	Tubular wells	0	55.0	.002	.005	2.8	1.650	.002	20	.15
Dedham	Large well and tubular wells	1	112.5	.009	.022	10.6	1.000	.001	49	.10
Deerfield (Fire District)	Wells	1	51.5	.002	.008	2.3	.072	.000	22	.13
Douglas	Tubular wells	0	64.0	.001	.005	3.5	.575	.000	21	.06
Dracut (Water Supply District)	Tubular wells	11	131.0	.009	.028	8.1	1.000	.000	67	.19
Dracut (Collinsville)	Tubular wells	1	67.7	.000	.009	4.0	.262	.000	28	.11
Dudley	Tubular wells	0	35.5	.002	.016	2.8	.020	.000	12	.06
Dunstable	Well	0	83.0	.002	.007	4.3	2.500	.000	30	.07
Duxbury (Fire and Water District)	Tubular wells	0	44.3	.000	.005	8.5	.056	.000	9	.08
East Brookfield	Tubular wells	0	32.6	.000	.008	2.3	.020	.000	9	.10
Easthampton	Tubular wells	0	72.0	.001	.009	1.6	.200	.000	43	.11
Easton (North Easton Village District)	Well	0	60.0	.002	.021	5.3	1.258	.000	27	.09
Edgartown	Large well	1	30.3	.000	.005	9.4	.020	.000	4	.07
Fairhaven	Old wells	37	77.5	.006	.066	10.2	.600	.000	31	.44
	New wells	0	66.6	.002	.011	10.7	.720	.001	27	.08
Foxborough (Water Supply District)	Tubular wells	0	56.3	.001	.011	5.0	.533	.000	24	.10
Framingham	Filter-gallery	2	159.9	.119	.042	25.6	.083	.120	76	.11
Franklin	Tubular wells	1	53.5	.001	.018	4.7	.047	.000	21	.18
Gill	Spring	0	81.5	.000	.009	2.7	1.750	.000	43	.13
Grafton	Filter-gallery	2	130.6	.000	.013	14.5	2.540	.000	49	.08
Granville	Well	1	43.7	.000	.006	1.2	.020	.000	12	.08
Great Barrington (Fire District)	Well near Green River	1	113.5	.002	.005	1.4	.117	.000	84	.08
	Filter-gallery near Green River	0	102.3	.000	.009	1.4	.035	.000	87	.08
Greenfield	Well near Green River	2	65.0	.000	.008	1.3	.020	.000	45	.06
Groton	Large well	1	73.7	.033	.019	3.1	.020	.001	47	.12
Groton (West Groton Water Supply District)	Tubular wells	3	57.2	.009	.007	2.3	.045	.009	32	.39
Hanover	Tubular wells	1	62.6	.001	.006	6.8	.094	.000	25	.10
Hardwick (Gilbertville)	Wells	0	81.3	.001	.004	1.7	.020	.000	45	.06
Hardwick (Wheelwright)	Wells	0	41.3	.000	.005	2.5	.290	.000	12	.09
Hingham	Wells	12	64.4	.013	.052	7.4	.086	.000	23	.12
Holliston	Large well	29	53.4	.017	.082	3.7	.023	.000	23	.48

## Averages of Chemical Analyses of Ground-Water Sources, etc.—Continued

(Parts per Million)

CITY OR TOWN	Source	Color	Residue on Evaporation	AMMONIA		Chlorine	NITROGEN AS —		Hardness	Iron
				Free	Albu- minoid		Nitrates	Nitrites		
Hopkinton . . .	New tubular wells	0	68.0	.000	.011	4.0	.867	.000	27	.09
Kingston . . .	Tubular wells . .	0	44.7	.002	.005	6.9	.023	.000	12	.08
Leicester (Water Supply District)	Wells . . . . .	4	60.3	.001	.013	2.7	.690	.000	31	.08
Leicester (Cherry Valley and Rochdale Water District)	Wells . . . . .	16	55.0	.023	.099	3.4	.020	.000	24	.15
Littleton . . .	Tubular wells . .	0	40.7	.001	.005	2.1	.273	.000	20	.07
LOWELL . . . .	Boulevard wells (tubular)	81	75.3	.623	.059	4.8	.272	.003	29	6.02
	Boulevard wells, filtered . . . .	10	59.9	.000	.018	4.8	.439	.000	27	.27
Manchester . .	Wells . . . . .	1	115.2	.002	.005	17.0	.850	.000	43	.12
Mansfield (Water Supply District)	Large well . . .	0	46.3	.001	.007	3.8	.083	.000	17	.09
Marblehead . .	Inlet of filter . .	7	170.0	.058	.045	22.3	.020	.000	93	1.85
	Outlet of filter . .	14	181.2	.007	.051	17.3	.033	.000	98	.36
	Well . . . . .	9	202.5	.009	.043	26.6	.127	.002	103	.32
Marion . . . .	Old wells . . . .	0	55.0	.000	.007	6.7	.250	.000	16	.07
	New wells . . . .	1	87.3	.001	.005	13.6	.400	.001	40	.08
Marshfield . .	Tubular wells . .	0	56.5	.002	.004	7.3	.020	.000	7	.09
	Tubular wells at Humarock Beach	1	105.7	.003	.005	23.2	.767	.001	24	.14
Mattapoisett . .	Old wells . . . .	1	60.2	.002	.012	7.2	.325	.000	25	.15
Medfield . . .	Spring . . . . .	4	46.7	.001	.029	3.7	.050	.000	18	.14
Medway . . . .	Wells . . . . .	1	84.6	.058	.013	9.2	.576	.000	36	.13
Merrimac . . .	Tubular wells . .	0	90.7	.008	.007	6.1	.130	.000	37	.13
Methuen . . . .	Tubular wells at Harris Brook	29	100.9	.046	.059	6.2	.400	.001	39	1.29
	Lone Tree Hill wells . . . .	0	75.2	.046	.029	6.0	.195	.005	33	.08
Middleborough (Fire District)	Well . . . . .	21	74.0	.101	.038	6.6	.320	.000	32	4.00
	Filtered water . .	11	66.0	.001	.016	6.5	.320	.000	26	.32
Millbury . . . .	Well . . . . .	0	55.2	.000	.014	3.4	.307	.000	25	.06
Millis . . . . .	Spring . . . . .	0	128.5	.002	.006	10.0	2.600	.000	58	.11
Monson . . . .	Old well . . . .	17	48.2	.002	.024	2.2	.027	.000	12	.10
	New well . . . .	0	41.2	.001	.010	1.9	.020	.000	11	.07
Monterey . . .	Springs . . . . .	1	90.4	.002	.024	1.5	—	—	79	.07
Nantucket . . .	Wells at Wyers Valley . . . . .	1	56.6	.000	.006	17.5	.026	.000	15	.09
Natick . . . . .	Large well . . .	0	121.5	.001	.013	11.9	.433	.000	63	.08
Needham . . . .	Old wells . . . .	0	98.0	.001	.010	8.8	2.300	.000	41	.09
	New wells . . . .	0	99.3	.000	.013	9.4	1.767	.000	38	.09
NEWBURYPORT .	Wells and Artichoke River, filtered . . . .	5	69.8	.004	.063	7.0	.148	.000	28	.18
NEWTON . . . .	Well No. 1 . . .	1	81.5	.001	.018	7.1	.046	.001	37	.09
	Well No. 2 . . .	1	78.2	.001	.021	6.9	.130	.000	37	.07
	Tap in pumping station (treated water)	2	129.6	.006	.021	7.6	.253	.000	32	.14
North Attleborough	Wells . . . . .	1	67.7	.002	.008	6.0	.305	.000	30	.10
Northbridge . .	Tubular wells . .	1	42.5	.001	.010	4.0	.060	.000	14	.12
Norton . . . . .	Tubular wells . .	3	52.0	.001	.012	3.4	.020	.000	15	.29
Norwood . . . .	Tubular wells . .	8	98.4	.006	.025	7.2	.633	.000	44	2.73
Oak Bluffs . . .	Springs . . . . .	1	43.0	.007	.034	8.7	.047	.000	8	.11
Orange . . . . .	Crystal Spring . .	4	39.5	.003	.017	1.8	—	—	12	.16
Oxford . . . . .	Tubular wells . .	0	52.7	.001	.007	3.5	.450	.000	23	.08
Palmer (Bondsville)	Tubular wells . .	0	60.5	.004	.004	3.1	.282	.000	27	.17
Pepperell . . . .	Tubular wells . .	0	52.0	.000	.007	1.7	.020	.000	16	.06
Provincetown . .	Tubular wells . .	0	107.5	.000	.007	44.6	.036	.000	24	.11
Reading . . . .	New tubular wells	3	64.0	.000	.004	6.0	.500	.000	31	.22
Salisbury . . . .	Old well . . . .	8	87.5	.002	.020	6.0	.020	.000	42	.23
	New well . . . .	14	101.7	.002	.007	6.4	.020	.000	56	.90
Scituate . . . .	Webster Meadow wells . . . . .	2	105.2	.039	.009	13.5	.315	.014	36	.06
Sharon . . . . .	Well . . . . .	0	217.0	.008	.006	32.7	3.375	.000	97	.08
	Tubular wells . .	0	65.2	.001	.004	6.5	.675	.000	27	.08
Sheffield . . . .	Smith Spring . .	1	32.0	.001	.012	1.2	.020	.000	18	.07
	Clark's Spring . .	2	53.0	.033	.027	1.4	.030	.000	34	.09
Shirley (Shirley Village Water District)	Well . . . . .	1	57.0	.000	.005	4.8	1.933	.000	21	.08
Shrewsbury . . .	Tubular wells . .	3	64.5	.004	.015	5.4	.825	.000	27	.23
Somerset . . . .	Tubular wells . .	12	90.5	.001	.010	6.0	.027	.000	37	.48
South Hadley (Fire District No. 2)	Large well . . .	2	53.3	.004	.009	1.8	.123	.000	26	.06
Sunderland . . .	Springs . . . . .	2	81.0	.000	.008	1.7	.020	.000	47	.14
Tisbury . . . . .	Well . . . . .	0	47.5	.001	.009	10.0	.020	.000	5	.04
Uxbridge . . . .	Tubular wells . .	0	66.0	.003	.007	5.8	.900	.000	24	.09
Walpole . . . .	Tubular wells . .	0	54.2	.000	.011	4.7	.300	.000	24	.37



*Averages of Chemical Analyses of Ground-Water Sources, etc.—Concluded*

[Parts per Million]

CITY OR TOWN	Source	Color	Residue on Evaporation	AMMONIA		Chlorine	NITROGEN AS —		Hardness	Iron
				Free	Albu- minoid		Nitrates	Nitrites		
WALTHAM . . .	Old well . . .	7	104.0	.052	.023	9.2	.034	.000	50	1.06
	New well . . .	1	76.9	.002	.020	6.9	.213	.000	38	.08
Ware . . .	Wells . . .	0	70.0	.002	.009	4.5	.875	.000	34	.06
	Large well . . .	0	77.8	.001	.010	4.4	.806	.000	29	.08
Wareham (Fire District) . . .	Tubular wells . . .	3	31.0	.000	.004	5.8	.020	.000	9	.08
Warren . . .	Tubular wells . . .	0	41.2	.000	.006	2.6	.250	.000	14	.07
Wayland . . .	Wells . . .	0	88.0	.001	.008	5.3	.700	.001	46	.12
Webster . . .	Wells . . .	0	47.3	.005	.012	3.4	.167	.000	22	.12
Wellesley . . .	Tubular wells at P. S. No. 1 . . .	6	102.5	.004	.013	9.6	.305	.000	43	.48
	Large dug well at P. S. No. 2 . . .	0	91.7	.001	.006	8.1	.400	.000	39	.09
	Large tubular well at P. S. No. 3 . . .	1	84.5	.000	.006	6.3	.575	.000	36	.09
Westborough . . .	Filter basin . . .	1	24.2	.004	.069	2.0	—	—	11	.09
West Brookfield . . .	Tubular wells . . .	0	53.5	.001	.008	2.4	.027	.000	14	.07
Westford . . .	Tubular wells . . .	1	61.0	.000	.005	2.0	.020	.000	30	.12
Weston . . .	Wells at Warren Avenue . . .	4	92.2	.001	.016	8.7	1.120	.001	47	.10
	Tubular wells at Kendal Green . . .	0	90.0	.001	.008	7.4	.682	.000	37	.10
West Stockbridge . . .	Johnson's Spring . . .	0	100.0	.003	.013	1.5	—	—	72	.11
Williamstown . . .	Cold Spring . . .	1	136.7	.005	.007	0.9	.267	.000	142	.07
	Sherman Spring . . .	0	95.3	.012	.014	0.9	.047	.000	83	.08
Wilmington . . .	Tubular wells . . .	0	75.7	.001	.005	7.2	.730	.000	28	.07
Winchendon . . .	Old well . . .	15	42.5	.008	.015	1.7	.020	.000	15	.79
	New well . . .	24	43.2	.012	.032	1.6	.020	.000	12	.26
WOBBURN . . .	Filter-gallery . . .	4	126.3	.008	.055	13.4	.453	.005	57	.17
	Layne well . . .	2	137.7	.042	.032	15.9	.182	.000	71	.07
Worthington (Fire District) . . .	Springs . . .	5	30.3	.005	.015	1.2	.020	.000	16	.92
Wrentham . . .	Tubular wells . . .	0	55.7	.001	.007	4.0	1.067	.000	24	.09
Yarmouth . . .	Tubular wells . . .	0	49.0	.000	.003	13.7	.020	.000	9	.08

## CONSUMPTION OF WATER

The consumption of water during the twelve months ending with December 31, 1932, in the various cities and towns throughout the State was considerably less than that during similar periods in 1930 and 1931. The greatest reduction was in those cities and towns where a considerable amount of water is usually consumed for industrial purposes, although in some instances the water consumption in residential districts also was reduced. These conditions, as shown in the following table, may be explained chiefly by the decrease in industrial activities and the abundance of rainfall in August and September.

*Average Daily Water Consumption in Industrial and Residential Communities*  
(subject to correction)

	Million Gallons Daily		
	1930	1931	1932
Metropolitan Water District*			
Industrial . . . . .	123.7	122.0	115.3
Residential . . . . .	12.8	12.8	12.7
State exclusive of Metropolitan Water District			
Industrial . . . . .	134.3	129.0	121.4
Residential . . . . .	28.3	27.7	29.0
State as a whole			
Industrial . . . . .	258.0	251.0	236.7
Residential . . . . .	41.1	40.5	41.7

\*Does not include Newton and Brookline.

The average daily water consumption in the various cities and towns where records are kept, copies of which are supplied to this Department, the estimated population in these cities and towns, and the per capita water consumption are shown in the following table:

*Average Daily Consumption of Water in Various Cities and Towns in 1932*

CITY OR TOWN	Esti- mated Popu- lation	Gallons	Gallons per Inhabit- ant	CITY OR TOWN	Esti- mated Popu- lation	Gallons	Gallons per Inhabit- ant
Metropolitan Water District				Groton . . .	2,437	200,000	82
Arlington . . .	40,555	1,927,000	48	Groveland . . .	2,336	67,000	29
Belmont . . .	24,345	1,398,000	57	Hanover . . .	2,829	104,000	37
Boston . . .	781,815	85,176,000	109	Hanson and Pem- broke . . .	3,688	149,000	40
Chelsea . . .	45,816	3,469,000	76	HAVERHILL . . .	48,710	3,643,000	75
EVERETT . . .	50,965	4,365,000	86	Hingham . . .	6,849	1,357,000	198
Lexington . . .	10,140	674,000	66	Holden . . .	4,045	238,000	59
MALDEN . . .	60,535	3,585,000	59	Holliston . . .	2,885	81,000	28
MEDFORD . . .	64,549	3,370,000	52	HOLYOKE . . .	56,537	6,920,000	122
MELROSE . . .	24,372	1,578,000	65	Hopkinton . . .	2,563	64,000	25
Milton . . .	17,863	893,000	50	Hudson . . .	8,604	365,000	42
Nahant . . .	1,664	202,000	121	Ipswich . . .	5,599	245,000	44
QUINCY . . .	76,754	5,228,000	68	Kingston . . .	2,731	255,000	93
REVERE . . .	36,647	2,160,000	59	Lancaster . . .	2,984	122,000	41
SOMERVILLE . . .	105,859	9,093,000	86	LAWRENCE . . .	85,068	4,346,000	51
Stoneham . . .	10,450	716,000	69	Lenox . . .	2,742	300,000	109
Swampscott . . .	10,903	770,000	71	Lincoln . . .	1,568	249,000	159
Watertown . . .	38,693	2,185,000	56	Littleton . . .	1,462	70,000	48
Winthrop . . .	17,129	1,202,000	70	Longmeadow . . .	4,878	252,000	52
Abington and Rockland . . .	13,396	523,000	39	LOWELL . . .	100,234	5,519,000	55
Acton . . .	2,520	88,000	35	Ludlow . . .	8,905	295,000	33
Acushnet . . .	4,092	66,000	16	LYNN . . .	102,320	7,203,000	70
Agawam . . .	7,417	293,000	40	Lynnfield . . .	1,699	24,000	14
Amesbury . . .	12,167	560,000	46	Manchester . . .	2,691	456,000	170
Amherst . . .	5,888	597,000	101	Mansfield . . .	6,364	462,000	73
Andover . . .	9,969	860,000	86	Marblehead . . .	8,850	768,000	87
Ashburnham . . .	2,079	96,000	46	Marion . . .	1,785	185,000	104
Ashland . . .	2,397	191,000	80	MARLBOROUGH . . .	15,587	733,000	47
Athol . . .	11,107	577,000	52	Marshfield . . .	1,625	213,000	131
ATTLEBORO . . .	22,228	1,185,000	53	Mattapoisett . . .	1,501	92,000	61
Avon . . .	2,435	126,000	52	Maynard . . .	7,156	300,000	42
Ayer . . .	3,071	172,000	56	Medfield . . .	4,145	102,000	25
Barnstable . . .	7,271	433,000	60	Medway . . .	3,156	180,000	57
Bedford . . .	3,038	157,000	52	Merrimac . . .	2,409	161,000	67
Belchertown . . .	3,233	29,000	9	Methuen . . .	21,255	1,084,000	51
BEVERLY . . .	26,047	1,501,000	58	Middleborough . . .	8,608	293,000	34
Billerica . . .	6,267	275,000	44	Milford and Hopedale . . .	17,714	967,000	55
Blandford . . .	588	13,000	22	Millbury . . .	7,164	421,000	59
Braintree . . .	16,720	891,000	53	Millis . . .	1,738	159,000	91
Bridgewater . . .	9,055	203,000	22	Montague . . .	9,359	864,000	92
BROCKTON . . .	63,797	3,372,000	53	Nantucket . . .	3,888	696,000	179
Brookfield . . .	1,352	53,000	39	Natick . . .	13,877	757,000	55
Brookline . . .	49,414	4,663,000	94	Needham . . .	11,592	735,000	68
CAMBRIDGE . . .	113,643	12,177,000	107	NEW BEDFORD . . .	112,597	8,662,000	77
Canton . . .	5,816	618,000	106	NEWBURYPORT . . .	15,084	1,318,000	87
Chatham . . .	2,007	65,000	32	NEWTON . . .	70,185	5,019,000	72
Chelmsford . . .	7,201	208,000	29	NORTH ADAMS . . .	21,621	1,626,000	75
CHICOPEE . . .	44,749	2,644,000	59	North Andover . . .	7,010	461,000	66
Clinton . . .	12,817	804,000	63	North Attle- borough . . .	10,360	674,000	65
Cohasset . . .	3,151	331,000	105	Northbridge . . .	9,713	612,000	63
Concord . . .	7,645	590,000	77	North Brookfield . . .	3,013	321,000	106
Danvers and Middleton . . .	15,150	1,149,000	76	Norton . . .	2,737	134,000	49
Dartmouth . . .	8,778	220,000	25	Norwood . . .	15,408	1,039,000	67
Dedham . . .	15,623	1,247,000	80	Oak Bluffs . . .	1,340	136,000	102
Douglas . . .	2,195	166,000	76	Oxford . . .	3,943	152,000	39
Dracut . . .	7,117	173,000	24	PEABODY . . .	21,935	2,769,000	126
Dudley . . .	4,265	158,000	37	Pepperell . . .	2,979	254,000	85
Duxbury . . .	1,699	202,000	119	PITTSFIELD . . .	50,797	4,945,000	97
East Bridgewater . . .	3,612	133,000	37	Plainville . . .	1,612	91,000	56
East Brookfield . . .	926	35,000	38	Plymouth . . .	13,042	1,017,000	78
Easthampton . . .	11,323	757,000	67	Provincetown . . .	3,856	380,000	99
East Longmeadow . . .	3,404	84,000	25	Randolph and Holbrook . . .	10,302	631,000	61
Easton . . .	5,298	244,000	46	Reading . . .	10,197	442,000	43
Edgartown . . .	1,293	128,000	99	Rockport . . .	3,630	414,000	114
Fairhaven . . .	11,000	456,000	41	Rutland . . .	2,525	227,000	90
FALL RIVER . . .	115,274	5,790,000	50	SALEM . . .	43,566	4,248,000	98
Falmouth . . .	4,872	723,000	148	Salisbury . . .	2,343	229,000	98
FITCHBURG . . .	40,692	4,022,000	99	Saugus . . .	15,483	824,000	53
Foxborough . . .	5,512	496,000	90	Scituate . . .	3,280	476,000	145
Framingham . . .	22,663	1,316,000	58	Sharon . . .	3,444	302,000	88
Franklin . . .	7,028	496,000	71	Shelburne . . .	1,547	84,000	54
GARDNER . . .	19,666	810,000	41	Shirley . . .	2,440	68,000	28
GLOUCESTER . . .	24,535	1,736,000	71	Shrewsbury . . .	7,346	265,000	36
Grafton . . .	7,053	194,000	28	Somers . . .	5,630	272,000	48
Greenfield . . .	15,601	1,380,000	88				

## Average Daily Consumption of Water in Various Cities and Towns in 1932

CITY OR TOWN	Estimated Population	Gallons	Gallons per Inhabitant	CITY OR TOWN	Estimated Population	Gallons	Gallons per Inhabitant
Southborough . . .	2,212	59,000	27	Webster . . .	12,992	690,000	53
Southbridge . . .	4,264	648,000	45	Wellesley . . .	12,395	922,000	74
South Hadley . . .	6,838	357,000	52	West Bridgewater . . .	3,240	153,000	47
Southwick . . .	1,539	18,000	12	West Brookfield . . .	1,255	54,000	43
SPRINGFIELD . . .	153,034	13,466,000	88	WESTFIELD . . .	19,948	1,777,000	89
Stockbridge . . .	1,762	328,000	186	Westford . . .	3,611	181,000	50
Stoughton . . .	8,343	554,000	66	Weston . . .	3,502	231,000	66
TAUNTON . . .	37,355	2,869,000	77	West Springfield . . .	17,227	1,248,000	72
Tisbury . . .	1,585	215,000	136	Weymouth . . .	22,333	1,457,000	65
Uxbridge . . .	6,330	202,000	32	Whitman . . .	7,638	276,000	36
Wakefield . . .	16,601	761,000	46	Wilbraham . . .	2,719	40,000	15
Walpole . . .	7,579	980,000	129	Wilmington . . .	4,212	105,000	25
WALTHEAM . . .	41,048	2,225,000	54	Winchester . . .	13,180	950,000	72
Ware . . .	7,385	292,000	40	WOBURN . . .	19,859	1,618,000	81
Wareham . . .	5,723	300,000	52	WORCESTER . . .	197,133	13,444,000	68
Warren . . .	3,765	63,000	17	Wrentham . . .	3,732	140,000	38
Wayland . . .	3,170	268,000	85	Yarmouth . . .	1,899	22,000	12

## RAINFALL

The following table shows the normal rainfall in the State as deduced from records of eight widely distributed stations having records for more than 51 years, also the rainfall for the year 1932, and the excess or deficiency of precipitation in each month as compared with the normal.

MONTH	Normal Rainfall (Inches)	Rainfall in 1932 (Inches)	Excess or Deficiency in 1932 (Inches)	MONTH	Normal Rainfall (Inches)	Rainfall in 1932 (Inches)	Excess or Deficiency in 1932 (Inches)
January . . .	3.76	5.08	+1.32	August . . .	4.18	4.47	+0.29
February . . .	3.58	2.54	-1.04	September . . .	3.45	6.76	+3.31
March . . .	3.93	5.18	+1.25	October . . .	3.70	6.20	+2.50
April . . .	3.66	1.98	-1.68	November . . .	3.87	5.99	+2.12
May . . .	3.59	1.86	-1.73	December . . .	3.67	1.97	-1.70
June . . .	3.32	2.00	-1.32				
July . . .	3.76	2.68	-1.08	Totals . . .	44.47	46.71	+2.24

## FLOW OF STREAMS

## Sudbury River

The average yield of the Sudbury River in the year 1932 was 1.651 cubic feet per second, or 1,067,000 gallons per day, per square mile of drainage area. The normal flow of this river for the 58 years during which records have been maintained is 1.498 cubic feet per second, or 968,000 gallons per day, per square mile. The average daily yield for the past year for the six driest months, May to October, inclusive, was 578,000 gallons per day per square mile, or 46.6 per cent more than the normal.

The following table shows the relation between the average daily yield of the Sudbury River per square mile in each month in the year 1932 and the normal yield of the river during the past 58 years. The drainage area of the river at the point of measurement is 75.2 square miles.

*Table showing the Average Daily Yield of the Sudbury River for Each Month in the Year 1932, in Cubic Feet per Second per Square Mile of Drainage Area, and in Million Gallons per Day per Square Mile of Drainage Area; also, Departure from the Normal.*

MONTH	NORMAL YIELD		ACTUAL YIELD IN 1932		EXCESS OR DEFICIENCY	
	Cubic Feet per Second per Square Mile	Million Gallons per Day per Square Mile	Cubic Feet per Second per Square Mile	Million Gallons per Day per Square Mile	Cubic Feet per Second per Square Mile	Million Gallons per Day per Square Mile
January . . . . .	1.710	1.105	1.592	1.029	-.118	-.076
February . . . . .	2.352	1.520	1.284	.830	-1.068	-.690
March . . . . .	4.103	2.652	2.852	1.843	-1.251	-.809
April . . . . .	3.032	1.960	2.806	1.814	-.226	-.146
May . . . . .	1.687	1.091	.710	.459	-.977	-.632
June . . . . .	.807	.522	.146	.094	-.661	-.428
July . . . . .	.315	.204	-.151	-.098	-.466	-.302
August . . . . .	.339	.219	.049	.031	-.290	-.188
September . . . . .	.381	.247	1.956	1.264	+1.575	+1.017
October . . . . .	.612	.396	2.660	1.719	+2.048	+1.323
November . . . . .	1.221	.789	4.508	2.914	+3.287	+2.125
December . . . . .	1.478	.955	1.468	.949	-.010	-.006
Average for whole year	1.498	968	1.651	1.067	+.153	+.099



The rainfall on the Sudbury River watershed and the total yield expressed in inches in depth (inches of rainfall collected) for each of the past six years, 1927 to 1932, inclusive, together with the average for a period of fifty-eight years, are given in the following table:

*Rainfall, in Inches, received and collected on the Sudbury River Drainage Area*

MONTH	1927			1928			1929		
	Rain-fall	Rain-fall collected	Per Cent collected	Rain-fall	Rain-fall collected	Per Cent collected	Rain-fall	Rain-fall collected	Per Cent collected
January . . .	2.91	2.313	79.5	2.69	2.328	86.7	3.99	2.349	58.9
February . . .	3.71	2.355	63.5	3.62	2.746	75.9	3.84	2.434	63.3
March . . .	1.43	3.664	256.6	1.96	2.274	116.3	3.14	4.751	151.5
April . . .	2.24	1.194	53.3	5.44	3.035	55.7	7.30	5.070	69.4
May . . .	2.97	1.369	46.1	2.47	2.523	102.4	3.65	3.199	87.6
June . . .	1.99	.370	18.6	6.36	2.736	43.0	1.65	.394	23.9
July . . .	3.82	.232	6.1	5.46	2.170	39.7	0.90	— .198	— 21.9
August . . .	8.92	1.688	18.9	4.50	.981	21.8	2.14	— .105	— 4.9
September . . .	3.82	2.260	59.3	3.84	1.026	26.7	2.11	— .043	— 2.1
October . . .	5.10	2.313	45.3	3.52	.938	26.7	2.85	.097	3.4
November . . .	8.21	6.950	84.6	2.16	1.018	47.0	2.97	.439	14.8
December . . .	5.61	4.931	87.8	2.68	1.500	56.0	4.08	.630	15.5
Totals and averages . . .	50.73	29.639	58.4	44.70	23.275	52.1	38.62	19.017	49.2

*Rainfall, in Inches, received and collected on the Sudbury River Drainage Area—Cont.*

MONTH	1930			1931			1932			Mean for Fifty-eight Years 1875-1932		
	Rain-fall	Rain-fall collected	Per Cent collected	Rain-fall	Rain-fall collected	Per Cent collected	Rain-fall	Rain-fall collected	Per Cent collected	Rain-fall	Rain-fall collected	Per Cent collected
January . . .	2.62	1.113	42.4	3.95	.832	21.0	4.69	1.835	39.1	3.95	1.971	49.9
February . . .	2.52	1.515	60.1	2.57	1.649	64.3	2.59	1.384	53.4	3.97	2.470	62.2
March . . .	3.84	2.584	67.4	5.89	6.159	104.5	5.51	3.288	59.7	4.21	4.730	112.4
April . . .	2.06	1.709	83.0	3.12	3.349	107.5	2.19	3.126	142.9	3.62	3.383	93.4
May . . .	3.07	.722	23.5	3.87	2.120	54.8	1.55	.819	52.8	3.23	1.945	60.3
June . . .	1.62	.077	4.8	7.18	3.405	47.4	3.28	.162	5.0	3.31	.900	27.2
July . . .	4.08	— .041	— 1.0	1.66	.557	33.5	1.92	— .175	— 9.1	3.62	.363	10.0
August . . .	2.49	— .147	— 5.9	4.93	.229	4.6	5.21	.056	1.1	3.85	.391	10.1
September . . .	0.81	— .313	— 38.5	1.19	— .176	— 14.8	10.57	2.185	20.7	3.40	.426	12.5
October . . .	4.37	.052	1.2	2.23	— .048	— 2.1	6.59	3.067	46.6	3.63	.706	19.4
November . . .	4.36	.860	19.7	0.95	.074	7.8	5.10	5.030	98.6	3.83	1.362	35.6
December . . .	2.56	.251	9.8	3.29	.532	16.1	1.92	1.692	87.7	3.74	1.704	45.6
Totals and averages . . .	34.40	8.382	24.4	40.83	18.682	45.7	51.12	22.469	43.9	44.36	20.351	45.8

The following table gives the record of the yield of the Sudbury River in gallons per day per square mile for each of the past six years and the mean for the past fifty-eight years:

*Yield of the Sudbury River Drainage Area in Gallons per Day per Square Mile<sup>1</sup>*

MONTH	1927	1928	1929	1930	1931	1932	Mean for Fifty-eight Years, 1875-1932
January . . .	1,297,000	1,305,000	1,317,000	624,000	466,000	1,029,000	1,105,000
February . . .	1,482,000	1,645,000	1,511,000	940,000	1,024,000	850,000	1,520,000
March . . .	2,054,000	1,275,000	2,664,000	1,449,000	3,453,000	1,843,000	2,652,000
April . . .	692,000	1,760,000	2,941,000	991,000	1,943,000	1,814,000	1,960,000
May . . .	768,000	1,414,000	1,793,000	405,000	1,188,000	459,000	1,091,000
June . . .	215,000	1,585,000	228,000	45,000	1,972,000	94,000	522,000
July . . .	130,000	1,217,000	— 111,000	— 23,000	312,000	— 98,000	204,000
August . . .	946,000	550,000	— 59,000	— 83,000	129,000	31,000	219,000
September . . .	1,307,000	594,000	— 25,000	— 181,000	— 102,000	1,264,000	247,000
October . . .	1,297,000	526,000	54,000	29,000	— 27,000	1,719,000	396,000
November . . .	4,026,000	589,000	254,000	498,000	43,000	2,914,000	789,000
December . . .	2,764,000	841,000	353,000	141,000	298,000	949,000	955,000
Average for whole year . . .	1,411,000	1,105,000	905,000	399,000	889,000	1,067,000	968,000
Average for driest six months . . .	676,000	721,000	55,000	33,000	110,000	578,000	394,000

<sup>1</sup>The drainage area of the Sudbury River used in making up these records included water surfaces amounting to about 2 per cent of the whole area from 1875 to 1878, inclusive, subsequently increasing by the construction of storage reservoirs to about 3 per cent in 1879, to 3.5 per cent in 1885, to 4 per cent in 1894, and to 6.5 per cent in 1898. The drainage area also contains extensive areas of swampy land, which, though covered with water at times, are not included in the above percentages of water surfaces.

*Nashua River*

The average yield of the South Branch of the Nashua River at the outlet of the Wachusett Reservoir in Clinton during the year 1932 was 1,169,000 gallons per day per square mile of drainage area, or 8.6 per cent above the average for the past 36 years.

The average yield for the six driest months, May to October, inclusive, was 597,000 gallons per day per square mile of drainage area, or 6.2 per cent greater than the normal for this period.

There were large deficiencies in the yield during the months of March, May and June. The months of February, July, August and December were also deficient. The yield was considerably in excess of the normal in January, October and November. There also was an excess yield in April and September.

The following table shows the normal yield of the South Branch of the Nashua River by months for the past 36 years, the actual yield in the year 1932, and the excess or deficiency in each month. The drainage area of the Nashua River above the point of measurement was 119 square miles from 1897 to 1907 and 118.19 square miles from 1908 to 1913, inclusive. Since January 1, 1914, the city of Worcester has been diverting water from 9.35 square miles of this drainage area for the supply of that city, and in 1932 a further diversion was made by taking water from a part of the Quinapoxet River watershed tributary to the Wachusett Reservoir. The net drainage area tributary to Wachusett Reservoir is 108.84 square miles. In determining the yield of this area allowance is made for the water diverted from the Quinapoxet River watershed to the water supply of the city of Worcester.

*Table showing the Average Daily Yield of the South Branch of the Nashua River for Each Month in the Year 1932, in Cubic Feet per Second per Square Mile of Drainage Area, and in Million Gallons per Day per Square Mile of Drainage Area; also, Departure from the Normal.*

MONTH	NORMAL YIELD		ACTUAL YIELD IN 1932		EXCESS OR DEFICIENCY	
	Cubic Feet per Second per Square Mile	Million Gallons per Day per Square Mile	Cubic Feet per Second per Square Mile	Million Gallons per Day per Square Mile	Cubic Feet per Second per Square Mile	Million Gallons per Day per Square Mile
January . . . . .	1.786	1.154	2.623	1.695	+ .837	+ .541
February . . . . .	1.976	1.277	1.768	1.143	— .208	— .134
March . . . . .	3.895	2.517	2.791	1.804	—1.104	— .713
April . . . . .	3.388	2.189	3.800	2.456	+ .412	+ .267
May . . . . .	1.992	1.287	1.093	.706	— .899	— .581
June . . . . .	1.278	.826	.524	.339	— .754	— .487
July . . . . .	.720	.465	.332	.215	— .388	— .250
August . . . . .	.648	.419	.437	.282	— .211	— .137
September . . . . .	.581	.375	.788	.509	+ .207	+ .134
October . . . . .	.745	.481	2.349	1.518	+1.604	+1.037
November . . . . .	1.265	.818	3.578	2.313	+2.313	+1.495
December . . . . .	1.725	1.115	1.662	1.074	— .063	— .041
Average for whole year	1.665	1.076	1.808	1.169	+ .143	+ .093

The rainfall on the Nashua River watershed and the total yield expressed in inches in depth upon the watershed (inches of rainfall collected) for each of the past six years, 1927 to 1932, inclusive, together with the average for the past 36 years, are given in the following table:

*Rainfall, in Inches, received and collected on the Nashua River Drainage Area*

MONTH	1927			1928			1929		
	Rain-fall	Rain-fall collected	Per Cent collected	Rain-fall	Rain-fall collected	Per Cent collected	Rain-fall	Rain-fall collected	Per Cent collected
January . . .	3.34	2.184	65.5	3.03	2.657	87.7	4.80	2.140	44.5
February . . .	4.63	1.784	38.6	3.92	3.014	77.0	4.28	2.310	54.0
March . . .	1.71	4.167	244.4	2.08	2.291	110.3	3.40	4.912	144.5
April . . .	2.10	1.669	79.7	5.30	3.679	69.4	5.83	4.953	84.9
May . . .	3.04	1.623	53.3	2.92	2.946	100.8	4.62	3.851	83.3
June . . .	2.17	.742	34.2	6.64	3.575	53.8	3.09	1.020	33.0
July . . .	5.94	.997	16.8	4.75	1.627	34.2	.85	.265	31.2
August . . .	9.48	2.875	30.3	5.07	1.179	23.2	1.50	.125	8.4
September . . .	3.51	2.086	59.4	3.83	1.117	29.1	2.00	.272	13.6
October . . .	5.02	1.972	39.2	1.99	.710	35.7	3.12	.427	13.7
November . . .	7.50	4.521	60.3	2.40	.776	32.4	3.14	.630	20.1
December . . .	6.23	4.552	73.0	2.08	1.199	57.6	3.30	.739	22.4
Totals and averages . . .	54.67	29.172	53.4	44.01	24.770	56.3	39.93	21.644	54.2

*Rainfall, in Inches, received and collected on the Nashua River Drainage Area—Cont.*

MONTH	1930			1931			1932			Mean for Thirty-six Years 1897-1932		
	Rain-fall	Rain-fall collected	Per Cent collected	Rain-fall	Rain-fall collected	Per Cent collected	Rain-fall	Rain-fall collected	Per Cent collected	Rain-fall	Rain-fall collected	Per Cent collected
January . . .	2.11	1.156	54.8	3.44	.881	25.6	5.71	3.024	53.0	3.67	2.059	56.1
February . . .	2.20	1.396	63.5	2.71	1.103	40.7	3.14	1.906	60.7	3.77	2.074	55.0
March . . .	3.65	2.146	58.7	5.00	4.545	90.9	5.25	3.218	61.3	3.97	4.490	113.1
April . . .	1.88	1.646	87.8	2.98	4.001	134.2	2.10	4.234	201.1	3.80	3.780	99.5
May . . .	2.77	1.039	37.5	5.01	2.258	45.1	1.58	1.260	79.7	3.31	2.296	69.4
June . . .	2.96	.773	26.1	6.07	3.089	51.0	2.27	.585	25.8	3.82	1.425	37.3
July . . .	5.72	.808	14.1	2.71	.694	25.6	3.55	.383	10.8	4.06	.830	20.5
August . . .	1.69	.399	23.5	6.95	1.083	15.6	4.23	.503	11.9	4.06	.748	18.4
September . . .	1.91	.406	21.3	2.04	.517	25.3	7.31	.880	12.0	3.59	.648	18.0
October . . .	3.55	.655	18.4	2.46	.487	19.8	7.38	2.708	36.7	3.33	.858	25.8
November . . .	3.92	.810	20.7	1.35	.546	40.5	5.21	3.992	76.7	3.71	1.411	38.0
December . . .	2.61	.661	25.4	3.63	1.209	33.3	2.20	1.916	87.2	3.89	1.989	51.1
Totals and averages . . .	34.97	11.895	34.0	44.35	20.413	46.0	49.93	24.609	49.3	44.98	22.608	50.3

The following table gives the record of the yield of the Nashua River watershed in gallons per day per square mile for each of the past six years and the mean for the past 36 years.

*Yield of the Nashua River Drainage Area in Gallons per Day per Square Mile<sup>1</sup>*

MONTH	1927	1928	1929	1930	1931	1932	Mean for Thirty-six Years, 1897-1932
January . . .	1,224,000	1,490,000	1,200,000	648,000	494,000	1,695,000	1,154,000
February . . .	1,108,000	1,806,000	1,434,000	867,000	685,000	1,143,000	1,277,000
March . . .	2,336,000	1,284,000	2,754,000	1,203,000	2,548,000	1,804,000	2,517,000
April . . .	968,000	2,134,000	2,873,000	955,000	2,321,000	2,456,000	2,189,000
May . . .	910,000	1,651,000	2,159,000	583,000	1,266,000	706,000	1,287,000
June . . .	450,000	2,071,000	591,000	448,000	1,789,000	339,000	826,000
July . . .	559,000	912,000	148,000	453,000	389,000	215,000	465,000
August . . .	1,612,000	661,000	70,000	224,000	607,000	282,000	419,000
September . . .	1,207,000	646,000	157,000	235,000	299,000	509,000	375,000
October . . .	1,105,000	398,000	239,000	367,000	273,000	1,518,000	481,000
November . . .	2,619,000	450,000	365,000	469,000	316,000	2,313,000	818,000
December . . .	2,552,000	672,000	414,000	371,000	678,000	1,074,000	1,115,000
Average for whole year . . .	1,389,000	1,176,000	1,031,000	566,000	972,000	1,169,000	1,076,000
Average for driest six months . . .	949,000	624,000	232,000	353,000	428,000	597,000	562,000

<sup>1</sup>The drainage area used in making up these records included water surfaces amounting to 2.2 per cent of the whole area from 1897 to 1902, inclusive, to 2.4 per cent in 1903, to 3.6 per cent in 1904, to 4.1 per cent in 1905, to 5.1 per cent in 1906, to 6 per cent in 1907, to 7 per cent in 1908, 1909 and 1910, to 6.5 per cent in 1911, to 6.8 per cent in 1912, to 7 per cent in 1913, to 7.4 per cent in 1914 and 1915, to 7.6 per cent in 1916, to 7.4 per cent in 1917 and 1918, to 7.5 per cent in 1919, 1920, 1921 and 1922, to 7.4 per cent in 1923 and 1924, to 6.4 per cent in 1925, to 5.9 per cent in 1926, to 5.7 per cent in 1927, to 7.6 per cent in 1928, to 7.4 per cent in 1929, to 5.6 per cent in 1930, to 6.0 per cent in 1931, and 7.3 per cent in 1932.



*Merrimack River*

The Merrimack River is the second in size of the streams of Massachusetts. The river rises in the White Mountains of New Hampshire and flows southerly through the central part of that State until it enters Massachusetts, where it turns to the east and flows in a general northeasterly direction the remainder of its course to the sea. The total length of its watershed from its extreme northerly limits in the mountains of northern New Hampshire to its extreme southerly limits in the hills of Hopkinton, Massachusetts, is about 137 miles and its extreme width about 66 miles. Its total drainage area above its mouth at Newburyport is about 5,000 square miles, of which about one-quarter is within the limits of Massachusetts and the remainder within the State of New Hampshire.

Records of the flow of the Merrimack River have been kept continuously at Lawrence since 1880. The drainage area of the river at that point is 4,663 square miles, including 118.19 square miles tributary to the South Branch of the Nashua River used for the water supply of the Metropolitan District and in part for the city of Worcester, 75.2 square miles on the Sudbury River, and 18 square miles tributary to Lake Cochituate. The flow as measured at Lawrence includes the water wasted from these drainage areas. In presenting the record of the flow of the river these drainage areas have been deducted, leaving the net drainage area above Lawrence 4,567 square miles in 1880, 4,570 square miles in the years 1891 to 1897, inclusive, and 4,452 square miles since the latter year. The quantity of water overflowing from the Cochituate and Sudbury watersheds as measured by the Metropolitan District Commission has also been deducted from the flow of the river as measured at Lawrence. The average flow of the river during the year 1932 amounted to 1.433 cubic feet per second per square mile, or 926,000 gallons per day per square mile of drainage area, which is about the normal for the past 53 years. The flow was more than the normal during the months of January, April, September, October, November and December. The greatest deficiency occurred in March.

The following table shows the relation between the normal flow of this stream during the past 53 years and the actual flow during each month of the year 1932.

*Table showing the Average Monthly Flow of the Merrimack River at Lawrence for the Year 1932, in Cubic Feet per Second per Square Mile of Drainage Area; also, Departure from the Normal.*

MONTH	Normal Flow, 1880-1932	Actual Flow in 1932	Excess or Deficiency
January . . . . .	1.255	1.803	+ .548
February . . . . .	1.328	1.301	— .027
March . . . . .	2.699	1.363	—1.336
April . . . . .	3.505	4.454	+ .949
May . . . . .	2.221	1.319	— .902
June . . . . .	1.255	.493	— .762
July . . . . .	.760	.499	— .261
August . . . . .	.649	.483	— .166
September . . . . .	.644	.673	+ .029
October . . . . .	.785	1.223	+ .438
November . . . . .	1.141	2.431	+1.290
December . . . . .	1.075	1.157	+ .082
Average for whole year . . . . .	1.460	1.433	— .027

The following table gives the record of the flow of the Merrimack River at Lawrence for each of the past six years, together with the average flow in the past 53 years, this amount being expressed in cubic feet per second per square mile of drainage area.

*Flow of the Merrimack River at Lawrence in Cubic Feet per Second per Square Mile*

MONTH	1927	1928	1929	1930	1931	1932	Mean for Fifty-three Years, 1880-1932
January	.955	2.039	1.537	.861	.423	1.803	1.255
February	1.047	2.069	1.487	.949	.478	1.301	1.328
March	3.161	2.048	3.649	2.242	1.603	1.363	2.699
April	1.828	3.437	3.993	2.035	3.665	4.454	3.505
May	1.417	3.160	3.424	1.172	1.897	1.319	2.221
June	.785	2.300	.973	1.055	2.207	.493	1.255
July	.645	1.636	.583	.521	.756	.499	.760
August	.708	1.550	.400	.520	.520	.483	.649
September	.949	1.500	.365	.378	.471	.673	.644
October	1.355	.977	.408	.311	.471	1.223	.785
November	3.733	.979	.409	.562	.621	2.431	1.141
December	3.015	1.115	.488	.518	.973	1.157	1.075
Average for whole year	1.633	1.901	1.484	.927	1.174	1.433	1.460
Average for driest six months	.977	1.293	.457	.468	.635	.782	.842

*Sudbury, Nashua and Merrimack Rivers*

The following table shows the weekly fluctuations during the year 1932 in the yield of the Sudbury River at Framingham, the South Branch of the Nashua River at the outlet of the Wachusett Reservoir in Clinton, and the Merrimack River at Lawrence. The flow of these streams, particularly that of the Sudbury River and the South Branch of the Nashua River, serves to indicate the flow of other streams in eastern Massachusetts. The area of the Sudbury River watershed is 75.2 square miles, of the South Branch of the Nashua River 118.19 square miles, and of the Merrimack River at Lawrence 4,452 square miles.

*Table Showing the Average Weekly Flow of the Sudbury, South Branch of the Nashua and the Merrimack Rivers for the Year 1932, in Cubic Feet per Second per Square Mile of Drainage Area*

WEEK ENDING SUNDAY —	Yield of Sudbury River	Yield of South Branch Nashua River	Flow of Merrimack River	WEEK ENDING SUNDAY —	Yield of Sudbury River	Yield of South Branch Nashua River	Flow of Merrimack River
Jan. 3 . . .	1.049	.937	1.193	July 3 . . .	.448	.757	.388
10 . . .	1.755	3.459	1.294	10 . . .	.979	.411	.537
17 . . .	2.861	2.430	2.237	17 . . .	1.353	.112	.645
24 . . .	1.538	2.111	2.243	24 . . .	1.629	.299	.476
31 . . .	1.537	3.114	1.823	31 . . .	—	.379	.413
Feb. 7 . . .	1.467	2.060	1.535	Aug. 7 . . .	.041	.906	.494
14 . . .	3.856	2.299	1.369	14 . . .	.045	.295	.539
21 . . .	5.211	1.647	1.385	21 . . .	.387	.408	.479
28 . . .	2.323	1.123	.954	28 . . .	.728	.168	.458
Mar. 6 . . .	1.831	2.600	1.226	Sept. 4 . . .	.291	.269	.358
13 . . .	3.489	2.716	1.696	11 . . .	.238	.093	.316
20 . . .	1.349	1.295	1.029	18 . . .	5.572	2.502	.918
27 . . .	1.984	2.924	1.077	25 . . .	6.354	.307	.995
Apr. 3 . . .	6.076	6.800	3.455	Oct. 2 . . .	.869	.408	.580
10 . . .	4.884	3.538	4.833	9 . . .	.707	.586	.975
17 . . .	4.576	5.295	6.571	16 . . .	.979	.188	.732
24 . . .	1.915	2.064	3.252	23 . . .	6.304	6.888	1.837
May 1 . . .	1.238	2.032	2.417	30 . . .	5.036	2.463	1.569
8 . . .	1.565	1.831	2.239	Nov. 6 . . .	5.418	2.136	1.683
15 . . .	1.599	1.090	1.355	13 . . .	8.578	6.884	2.568
22 . . .	2.017	.698	1.031	20 . . .	7.512	3.706	2.518
29 . . .	.662	.672	.691	27 . . .	6.786	2.198	3.190
June 5 . . .	.061	.552	.721	Dec. 4 . . .	3.382	1.581	1.449
12 . . .	—	.207	.338	11 . . .	1.404	1.443	1.277
19 . . .	.649	.727	.441	18 . . .	1.116	1.184	.953
26 . . .	1.111	.261	.387	25 . . .	1.153	1.510	.891

## EXAMINATION OF RIVERS

The principal rivers of the State have been examined during the past year, and samples of water have been collected for analysis from the more important streams at the same points as in previous years. These examinations have been confined to June to November, inclusive. The decrease in industrial activities in certain parts of the State has resulted in an improvement in the sanitary condition of many of the rivers and streams.

*Aberjona River*

A branch of the Aberjona River sewer, which is connected with the Metropolitan sewerage system, was extended by the city of Woburn to the plant of the East Woburn Tanning Company early in the year, but this tannery is no longer in operation. A further extension to the northerly end of the city is being considered. The question of the pollution of the river by the wastes from the Lord Tanning Company in the northerly part of the city was considered by the Department twice during the year, and the Department made certain recommendations relative to the construction of tannery waste treatment works. Instead of building permanent works the company has treated its wastes with chemicals. Experiments on the treatment of these wastes were made by the Department during the year. If the extension of the Aberjona River sewer referred to above is made to this tannery, it will be unnecessary for the Department to proceed under the provisions of Chapter 291 of the Acts of 1911. There was evidence of some pollution of the Aberjona River by tannery and similar wastes during the drier part of the year and also some discoloration due to seepage from the deposits of iron pyrites at the abandoned plant of the Merrimac Chemical Company in North Woburn.

The results of the analyses of samples of water from the river continue to show pollution in parts of its course, but as a whole its condition is much improved over that of recent years.

*Assabet River*

The results of the analyses show a decided improvement in the condition of this stream at nearly all points except below Maynard where there was an increase in pollution.

*Blackstone River*

Kettle Brook, one of the principal tributaries of the Blackstone River in the upper part of its course, has shown an increase in pollution due to the small flow in the brook during the first part of the summer and the increased activity at some of the industrial plants, particularly in Worcester near the Leicester line. Complaint was made to this Department during the year relative to the condition of this brook in Worcester, and the Department recommended the extension of the Worcester sewers to the mills in this valley.

The condition of the Blackstone River below Worcester, both above and below the sewage disposal works of that city and farther down stream, has shown a general improvement. The examinations of the river below Worcester and Millbury have continued to show considerable quantities of iron, tar and oil from industries in Worcester.

*Charles River*

The condition of this stream below Milford has continued to show some evidence of pollution, although a slight improvement has been noted in the analyses. The same statement applies to Mine Brook, one of the tributaries below the Franklin sewage filters. Gas bubbles were noticeable in the river below Milford. The river below Medway, while still objectionable, has shown a slight improvement over previous years. Below Medfield there has been a slight increase in pollution, but throughout the rest of its course to the Charles River Basin the condition of the river, as shown by the results of the analyses, was slightly improved. The filling in of the Charles River Basin has caused a turbid condition in this part of the stream.

*Chicopee River*

Samples of water from the Chicopee River have been collected at Chicopee Falls, and the analyses show that the river was in a reasonably satisfactory condition at the time of each examination. The tributary known as the Quaboag River has been slightly less polluted than in previous years. This stream is polluted by sewage from the Monson State Hospital and certain municipalities along its course. The Ware River, while showing evidence of pollution above and below Ware, was not in an offensive condition and when examined during the past year showed a slight improvement over earlier conditions.



*Concord and Sudbury Rivers*

Bannister Brook, one of the tributaries of the Sudbury River which enters the river near Saxonville, receives the effluent and some untreated sewage from the sewage filter beds of the towns of Framingham and Natick. Complaint was received during the year by this Department relative to the condition of Bannister Brook, and the results of the analyses of samples of water collected during the year show an increase in the amount of pollution over the previous year due to the pollution from the Natick and Framingham sewage disposal works. Below Saxonville the condition of the river showed a slight improvement, while the Concord River below the junction of its principal tributaries, the Sudbury and Assabet rivers, and at its mouth has shown an increase in pollution.

*Connecticut River*

The Connecticut River has shown no material change during the year. Mill River and the Manhan River, small tributaries, are badly polluted by sewage, and the results of the analyses show an increase in pollution. Mill River was in an offensive condition due to the discharge of sewage from the city of Northampton. The Manhan River also has been in an offensive condition due to the discharge of large quantities of sewage from the town of Easthampton.

*French River*

The French River, while very badly polluted below Webster and Dudley by domestic sewage and industrial wastes discharged directly into the stream, has shown a slight improvement, a condition due evidently to the discharge of smaller quantities of industrial wastes.

*Hoosick River*

The question of the pollution of the Hoosick River has received much consideration during the last few years and in 1931 the Department urged the towns of Adams and Williamstown and the city of North Adams to consider the matter of a joint sewerage system and sewage disposal works, but no definite action has been taken.

The analyses of samples of the water from the river show a considerable amount of pollution, particularly at points below North Adams. The river in the lower portion of its course in Massachusetts frequently gives off a sewage odor and carries an oily sleek.

*Housatonic River*

The results of the analyses of samples of water of the Housatonic River show in most instances a slight improvement in its condition due largely to the small amount of industrial waste discharged into this stream. The river below the Pittsfield sewage pumping station has shown a slight improvement, but the discharge of the poorly purified effluent and sewage from the Pittsfield sewage disposal works has had an objectionable effect upon the river for a considerable distance down stream. Below Stockbridge there has been a slight improvement in the condition of the river but below Great Barrington there has been evidence of a slight increase in the pollution.

*Merrimack River*

In accordance with the provisions of Chapter 202 of the Acts of 1929, the Department of Public Health has investigated the condition of the Merrimack River and the pollution thereof within the limits of the Commonwealth. The investigation this year has indicated no great change in the condition of the river from that of the previous year.

*Nashua River*

There has been a slight increase in pollution of the North Branch of the Nashua River above the Fitchburg sewage disposal works. At the point where the river enters Leominster a slight improvement has been noted. A large quantity of sewage formerly discharged by the city of Leominster into Monoosnock Brook was diverted by a sewer constructed in 1931 to the small sewage disposal works located near Mechanics Street, but the analyses during the year showed an increase in the

pollution of this brook at its mouth over those of 1931. There is evidence of more pollution of the North Branch of the river below Leominster than above this city due to the discharge of sewage from the city of Leominster and to improperly treated effluent from the small sewage disposal works in that city. A sewage odor is frequently noticeable near the river below the city. A plan for a new intermittent sand filtration works for the city of Leominster was received during the latter part of the year, but the Department could not approve it and advised that plans be prepared by an engineer of experience in such matters for a modification of the plan proposed in 1929. Adequate sewage disposal works are badly needed in this city.

There has been little change in the condition of the South Branch of the river above and below Clinton and in the main stream throughout the remainder of its course.

#### *Neponset River*

The Metropolitan sewer extension which is to take care of the sewage from the towns of Norwood, Walpole, Stoughton and Canton, was so far completed at the end of the year that the towns of Norwood and Walpole were able to make connections on August 13, 1932, and September 6, 1932, respectively, for the disposal of their sewage and most of the manufacturing plants are now discharging a large portion of their wastes into the sewerage system. The plants of Bird & Son, Inc. made a connection with the Norwood system September 2, 1932, and with the Walpole system on September 6, 1932, while the plant of Hollingsworth & Vose connected with the Walpole sewerage system November 14, 1932, and that of the Lewis Manufacturing Company on September 6 and 25, 1932. A connection was made at the tannery of Winslow Bros. & Smith in Norwood on November 29, 1932. Presumably the towns of Stoughton and Canton will make connections in 1933. The analyses during the year 1932 showed an increase in pollution of this river at certain points and, in general, the stream has continued to be considerably polluted throughout much of the lower portion of its course, except in the month of November when there was a very marked improvement.

It is to be assumed that the time-consuming work of the Department of Public Health and its predecessor, the State Board of Health, on this river which was started in the early nineties and on which legislation was first adopted in 1895 has now been completed and that the condition of this stream will rapidly improve.

#### *North River, Salem and Peabody*

The North River in Salem and Peabody has shown more evidence of pollution than in 1930 and 1931. The suspended solids in three samples taken on the outgoing tide at the mouth during October and November 1932 averaged 83.0 parts per million. The average albuminoid ammonia in seven samples taken in the months of June to November, inclusive, was 5.046 parts per million. The river at its mouth was devoid of oxygen at the time of each examination except in the month of November. The river at its mouth and at Hawley Street generally gave off a tannery waste odor when examined during the warmer months. During the year 1932 legislation designed to improve sewerage conditions in this valley again failed of enactment. This stream continues to be the most seriously polluted stream in the State.

#### *Taunton River*

During the past year complaint was made of the condition of the Salisbury Plain River below Brockton due to the discharge of gas works wastes into this river, and experiments are being made relative to the disposal of the wastes in question. Mill River at its mouth at Taunton, a stream considerably polluted by sewage, has shown a slight improvement. The Taunton River throughout its course has shown, in general, a slight improvement in its condition over previous years.

The examinations of the other streams have shown no particular change during the past year.

## MUNICIPAL SEWAGE DISPOSAL WORKS

All of the sewage disposal works have been examined during the year and samples have been collected of the sewage, settled sewage and effluent at frequent intervals. The works at Concord, Hopedale, Marion, Maynard, Northbridge and Winchendon appear to require no particular comment.

At Attleboro the sewage is discharged onto the beds without preliminary treatment. Welfare labor has been used during the year for the cleaning of the beds and the removal of brush, etc., from land adjoining them.

At Brockton the works are carefully operated under local laboratory control.

At Clinton the sewage disposal works are of inadequate capacity, and a considerable portion of the sewage is allowed to overflow from the filter beds with little or no treatment. When the sewage is treated the effluent contains large quantities of iron and is not well purified. An enlargement of these works or a more modern form of treatment is necessary in order to prevent offensive conditions in the region about the works.

At Easthampton much of the sewage was allowed to discharge into the Manhan River after passing through the settling tanks.

At Fitchburg the disposal works have been operated under expert supervision, and the analyses of the final effluent show that the sewage has been reasonably well purified. Welfare labor has been used at this plant during the year for the improvement of the grounds about the plant and this work has been done with much satisfaction.

A complaint was made during the year relative to the pollution of Bannister Brook which receives the effluent and unpurified sewage from the sewage disposal works of the towns of Framingham and Natick. The subsequent investigation disclosed the fact that considerable quantities of sewage were being discharged from time to time from both plants without treatment. The matter was taken up with the town authorities, and plans were subsequently submitted for the extension of the filter beds of the town of Framingham. Welfare labor was used in the necessary excavations, but this work had not been completed at the end of the year.

The Worcester Turnpike, one of the most important arteries out of Boston, passes between these two sewage disposal works. In fact when completed this highway may encroach slightly on both groups of filter beds. It is probable that this region will grow more or less rapidly in the future. It is recognized that both of these sewage disposal works are inadequate, and toward the end of the year conferences were held with the boards of public works of the towns of Framingham and Natick to determine what action could be taken jointly or otherwise with a view to removing the sewage from these two municipalities to a more suitable place for disposal or with a view to combining their efforts in the construction of more adequate and permanent works near the present location. These conferences had not been completed at the end of the year. The results of the operation of both the Framingham and Natick sewage disposal works during the year were unsatisfactory, though the effluent from the more recently constructed portion of the Framingham works was reasonably satisfactory.

The sewage of the town of Franklin was not well purified during the past year, and the plant has not been given sufficient attention especially in connection with the distribution of the sewage over the entire area. Complaint was made concerning the odors arising from the plant during the year, and a special communication was sent to the officers of the town recommending more care in the operation of the works.

At the larger works in Gardner, known as the Templeton area, very little was done during the year toward completing the additional filter beds having an aggregate area of four acres, plans for which were approved by this Department in 1930, but the small increase in area has effected a slight improvement in the efficiency of the plant.

At Hudson the examinations of the filter beds and analyses indicate a tendency to clogging. Additional filter beds will be needed at this plant at no far distant date.

The sewage disposal works at Leicester have not a sufficient capacity to properly



care for all the sewage, and the results are unsatisfactory. Considerable quantities of sewage are allowed to overflow without treatment.

At Leominster considerably more sewage has been discharged to the small experimental sewage treatment plant than in former years, and the plant is in no way capable of purifying even a small portion of the sewage discharged to it. The city has done considerable work in separating surface drainage from the sanitary sewers. A special examination was made during the latter part of the year in connection with the investigation relative to the enlargement of the disposal works. The need of sewage disposal works in Leominster is mentioned under the Nashua River in another part of this report.

The efficiency of the sewage disposal works at Marlborough has been considerably reduced during the past year. Examinations of the filter beds have shown that there is considerable surface clogging and also that the underdrains are clogged. The city, with the aid of welfare labor, was able to reconstruct one of the old filter beds during the latter part of the year. Further reconstruction work is necessary to bring this plant into proper condition.

The sewage disposal works in the town of Milford consist of plain sedimentation, a sand filtration system, an Imhoff tank and trickling filter. This is a complicated plant to operate and should receive more attention than in the past. The sewage discharged to the old portion of the works is not well purified, and the effluent from the new works has not been as satisfactory as in previous years. The old sand filters contain very fine material. The examinations of the river below the town show evidence of pollution, and at times septic action is noticeable. It seems advisable that the town make an investigation to determine the best method of improving its sewage disposal works, and such an investigation should be made by an engineer having experience in such matters.

The filter beds at Nantucket consist of coarse sand and are capable of disposing of considerable quantities of sewage. The works are located on the southerly side of the island, and the heavy winds blow foreign materials onto the beds in such a way that their capacity has been somewhat decreased. This foreign material should be removed from the filters and the work of reconstruction should be continued as rapidly as possible in order to place this plant in proper condition before the influx of the summer population.

At North Attleborough the sewage disposal works were enlarged in 1930, and two of the old filters have since been reconstructed. This has resulted in an improvement of the efficiency of the works but further enlargements are necessary.

At Norwood the sewage disposal works were abandoned following the connection on August 13, 1932, of the town sewers with the Neponset Valley Sewer of the South Metropolitan System.

At Pittsfield the sewage disposal works have shown less satisfactory results than heretofore, and the plant has received very little attention. Welfare labor has been used to a limited extent but not sufficiently to obtain satisfactory results. Large quantities of sewage have been allowed to overflow into the Housatonic River from the filters without treatment and offensive odors have been noticed near the sewage disposal works. The improvement of the storage basins at the sewage pumping station so that they could be operated as settling tanks was completed during the year. The disposal works should be enlarged in accordance with plans heretofore approved by this Department.

At Southbridge little improvement has been shown in the disposal of the sewage of this town, and much sewage has been overflowed at times of storm. Near the close of the year the Sewer Commissioners asked advice relative to improvement of this plant by the use of welfare labor, and the matter was under consideration at the end of the year.

At Spencer considerable quantities of sewage have been allowed to overflow, particularly at times of storm. The disposal works are not adequate for the proper treatment of the entire quantity of sewage.

At Stockbridge enlargements and reconstruction of the present works are necessary and this work should be done under engineering supervision.

At Westborough the additional area recently constructed has produced a greater efficiency in the operation of these works.

The sewage disposal works at Worcester which were considered in House Document 402 of the Legislature of 1932 are operated under expert management, and the results of the operation of this plant have been largely instrumental in the improvement of the condition of the Blackstone River below Worcester.

During the year letters were sent out from this Department suggesting the use of labor supplied from welfare departments in the extension of certain sewage disposal works and in their more adequate maintenance. Examinations and inspections made at many of the works have shown that very satisfactory results have been obtained in most instances by using welfare labor.

The results of the Department's analyses and the records of operation of the larger municipal sewage disposal works are given in the appended tables. With a view to eliminating a duplication of effort, only check samples have been taken at Brockton and Worcester, and the results of the analyses from the local laboratories are used in the following tables:

TABLE No. 1.—Average Results of the Analyses of Monthly Samples of Sewage as received at Disposal Works. (Fats determined in about 51 per cent of the Samples)  
[Parts in 1,000,000]

CITY OR TOWN	RESIDUE ON EVAPORATION						AMMONIA				Chlorine		OXYGEN CONSUMED		IRON		Kjeldahl Nitrogen	Fats
	TOTAL RESIDUE			LOSS ON IGNITION			ALUMINOID				Unfil-tered	Fil-tered	Unfil-tered	Fil-tered				
	Total	Dis-solved	Sus-pended	Total	Dis-solved	Sus-pended	Free	Total	Dis-solved	Sus-pended								
ATTLEBORO <sup>1</sup>	375.0	266.7	108.3	200.3	116.3	84.0	26.13	4.05	2.57	1.48	48.6	27.4	1.91	.81	11.1	—		
BROCKTON <sup>2</sup>	661.0	457.0	204.0	351.0	187.0	164.0	34.90	9.50	6.70	2.80	139.2	56.1	—	—	—	—		
Clinton <sup>3</sup>	855.8	537.1	318.7	524.1	266.8	257.3	30.42	8.57	5.10	3.47	91.2	56.1	2.88	.96	20.2	108.1		
Concord <sup>1</sup>	180.6	160.7	19.9	70.3	54.7	15.6	9.47	1.29	.92	.37	13.8	10.7	.53	.34	2.8	—		
Easthampton <sup>1</sup>	642.4	430.4	212.0	386.0	212.4	173.6	48.64	7.35	4.17	3.18	82.7	53.4	1.30	.41	19.5	—		
FITCHBURG	514.8	333.6	181.2	292.8	146.8	146.0	23.04	5.60	3.92	1.68	63.7	38.5	3.45	1.05	17.6	92.5		
Frammingham (Imhoff) <sup>4</sup>	737.1	482.3	254.8	389.3	203.3	186.0	40.82	7.13	4.45	2.68	78.1	42.6	2.11	.82	17.1	101.2		
Frammingham <sup>3</sup>	750.3	461.6	288.7	397.6	194.3	203.3	43.33	7.80	5.38	2.42	92.6	46.7	3.07	.90	60.7	154.9		
Franklin <sup>1</sup>	529.0	342.0	187.0	284.0	120.0	164.0	33.02	7.36	4.57	2.79	56.8	29.5	1.79	.64	17.1	—		
GARDNER (Gardner Area) <sup>5</sup>	832.5	496.0	336.5	528.0	239.0	289.0	73.80	14.95	9.67	5.28	64.7	44.0	2.48	.68	31.9	139.6		
GARDNER (Templeton Area)	637.7	414.6	223.1	387.2	185.8	201.4	65.78	10.06	6.33	3.73	81.6	41.6	1.67	.63	22.7	89.6		
Hopedale <sup>5</sup>	501.0	301.0	200.0	319.5	150.0	169.5	34.20	7.48	4.42	3.06	84.7	47.2	2.80	.48	17.0	—		
Hudson	636.6	425.4	211.2	375.6	199.2	176.4	60.52	9.82	5.61	4.21	59.5	45.5	1.59	.65	22.4	93.7		
Leicester <sup>1</sup>	374.7	305.0	69.7	202.0	151.3	50.7	26.43	4.18	2.56	1.62	46.9	29.0	1.68	.37	10.5	—		
Marion <sup>6</sup>	581.2	248.4	332.8	434.0	121.6	312.4	9.90	4.20	2.38	1.82	78.7	42.1	1.48	.62	10.7	—		
MARLBOROUGH	561.1	407.4	153.7	320.0	189.1	130.9	32.17	7.33	4.50	2.83	49.9	41.6	1.68	.57	16.9	70.7		
Maynard	772.9	356.0	416.9	524.0	177.6	346.4	60.98	13.37	7.21	6.16	104.5	46.4	2.03	.55	29.2	—		
Millford	571.8	327.1	244.7	350.5	135.8	214.7	39.93	6.70	4.19	2.51	53.8	30.2	1.15	.39	14.04	—		
Natick <sup>3</sup>	523.6	312.5	211.1	290.0	112.7	177.3	35.35	6.94	3.22	3.72	39.4	23.3	1.51	.42	13.6	68.9		
North Attleborough <sup>1</sup>	374.3	239.3	135.0	215.0	95.3	119.7	17.68	3.05	2.05	1.00	35.7	19.8	1.26	.50	7.8	—		
Northbridge	424.0	271.5	152.5	260.0	124.4	135.6	45.31	7.32	4.66	2.66	55.5	32.5	1.24	.43	17.3	—		
Pittsfield <sup>3</sup>	555.0	364.3	190.7	324.0	167.5	156.5	38.37	6.55	4.31	2.24	63.6	36.1	5.16	.72	16.9	61.9		
Southbridge <sup>1</sup>	734.6	461.0	273.6	488.0	250.0	238.0	55.83	10.27	6.02	4.25	96.7	48.5	1.56	.60	21.9	147.1		
Spencer <sup>1</sup>	864.0	360.3	503.7	637.3	188.3	449.0	30.40	10.91	6.92	5.99	129.6	52.6	5.02	.95	31.3	92.2		
Stockbridge <sup>5</sup>	372.0	292.5	79.5	204.5	140.5	64.0	25.85	3.05	2.33	.72	35.9	25.7	.61	.25	7.0	—		
Westborough	446.5	254.5	192.0	280.9	124.1	156.8	33.18	5.47	3.44	2.03	55.4	30.7	1.05	.39	15.9	81.8		
Winchendon <sup>5</sup>	545.0	236.5	109.0	185.0	91.5	93.5	15.20	4.41	2.52	1.89	37.3	21.1	2.47	1.13	7.7	—		
WORCESTER <sup>2</sup>	584.0	411.0	173.0	255.0	147.0	108.0	13.10	—	—	—	150.5	59.3	23.40	10.10	—	—		

<sup>1</sup>Six samples.  
<sup>2</sup>Analyses from local laboratory.

<sup>3</sup>Four samples.

<sup>4</sup>At pumping station.

<sup>5</sup>Five samples.

<sup>6</sup>Entrance to Imhoff tanks, including Saxonville sewage.



TABLE NO. 2.—Average Results of the Analyses of Monthly Samples of Sewage as Applied to Filter Beds after Preliminary Treatment as Indicated. (Fats determined in about 51 Per Cent of the Samples.)

[Parts in 1,000,000]

CITY OR TOWN	Form of Preliminary Treatment	RESIDUE ON EVAPORATION				AMMONIA				OXYGEN CONSUMED		IRON		Kjeldahl Nitrogen	Fats		
		TOTAL RESIDUE		LOSS ON IGNITION		Free	ALBUMINOID			Unfiltered	Filtered	Unfiltered	Filtered				
		Total	Dissolved	Suspended	Total		Dissolved	Suspended									
ATTLEBORO <sup>1</sup>	None	375.0	266.7	108.3	200.3	116.3	84.0	26.13	4.05	2.57	1.48	48.6	27.4	1.91	.81	11.1	—
BROCKTON <sup>2</sup>	Tanks	557.0	460.0	97.0	264.0	188.0	76.0	34.50	7.60	6.10	1.50	113.8	—	—	—	—	—
CLINTON	Basins	395.0	355.0	40.0	185.4	153.4	32.0	24.56	3.84	2.99	.85	40.4	32.6	1.95	1.27	10.0	62.0
Concord <sup>1</sup>	None	180.6	160.7	19.9	70.3	54.7	15.6	9.47	1.29	.92	.37	13.8	10.7	.53	.34	2.8	—
Easthampton <sup>1</sup>	Tanks	526.0	418.0	108.0	288.8	203.6	85.2	48.96	5.42	3.82	1.60	62.1	45.1	.91	.35	13.5	—
FITCHBURG	Tanks <sup>3</sup>	303.6	273.2	30.4	136.0	113.2	22.8	24.24	3.12	2.55	.57	38.5	30.7	2.69	1.15	8.5	32.1
Frammingham	Tanks <sup>3</sup>	480.5	422.7	57.8	214.5	171.0	43.5	42.18	4.73	3.16	1.57	48.8	34.5	1.44	.79	10.5	48.5
Franklin <sup>1</sup>	Tanks	304.8	264.4	40.4	133.6	106.8	26.8	25.26	2.69	1.91	.78	29.5	21.5	.74	.52	7.5	—
GARDNER (Gardner Area) <sup>4</sup>	None	832.5	496.0	336.5	528.0	239.0	289.0	73.80	14.95	9.67	5.28	97.0	44.0	2.48	.68	31.9	139.6
GARDNER (Templeton Area)	Tanks	384.8	317.0	67.8	184.8	130.7	54.1	40.40	4.65	3.14	1.51	41.1	29.8	1.43	.80	11.2	36.1
Hopedale <sup>4</sup>	Tanks	314.5	236.5	78.0	159.0	98.0	61.0	32.35	2.95	2.09	.86	32.4	25.7	1.48	.63	7.1	—
Hudson	Tanks	447.2	354.6	92.6	234.6	158.2	76.4	49.00	5.51	3.39	2.12	47.4	33.5	1.78	.75	13.8	57.3
Leicester <sup>1</sup>	None	374.7	305.0	69.7	202.0	151.3	26.43	26.43	4.18	2.56	1.62	31.8	29.0	1.68	.37	10.5	—
Marion <sup>5</sup>	Tanks	305.6	208.8	96.8	180.8	89.2	91.6	16.40	2.21	1.36	.85	35.3	25.4	1.32	.68	5.6	—
MARLBOROUGH	Tanks	488.6	398.2	90.4	254.3	173.1	81.2	40.40	5.68	4.01	1.67	63.9	37.1	1.28	.60	13.1	51.8
Maynard	Tanks <sup>3</sup>	317.6	284.5	33.1	155.1	129.4	25.7	47.89	3.87	2.63	1.24	39.0	30.7	.84	.48	8.4	—
Milford	Tanks	405.1	338.0	47.1	184.0	146.2	37.8	38.27	3.87	2.61	1.26	49.6	27.8	1.05	.54	8.0	—
Milford	Tanks <sup>3</sup>	333.8	295.7	38.1	140.0	109.3	30.7	30.07	3.08	2.09	.99	31.7	22.0	.79	.45	6.8	—
Natick	None	522.6	312.5	211.1	290.0	112.7	177.3	35.35	6.94	3.22	3.72	49.8	23.3	1.51	.42	13.6	68.9
North Attleborough <sup>1</sup>	Tanks	266.3	228.0	38.3	120.0	85.7	34.3	15.16	2.26	1.57	.69	26.0	18.2	1.03	.49	6.3	—
Northbridge	Tanks	201.3	166.4	34.9	97.1	68.6	28.5	20.89	2.51	1.77	.74	23.4	17.7	.84	.51	6.6	—
Pittsfield	None	555.0	364.3	190.7	394.0	167.5	156.5	38.37	6.55	4.31	2.24	63.6	36.1	5.16	.72	16.9	61.9
Southbridge <sup>1</sup>	Tanks	439.6	361.0	78.6	249.6	182.3	66.9	41.97	5.06	3.58	1.48	55.5	33.9	1.50	.95	13.2	59.8
Spencer	None	864.0	360.3	503.7	637.3	388.3	449.0	30.40	10.91	4.92	5.99	129.6	52.6	5.02	.95	31.3	92.2
Stockbridge <sup>4</sup>	None	372.0	292.5	79.5	204.5	140.5	64.0	25.85	3.05	2.33	.72	35.9	25.7	.61	.25	7.0	—
Westborough	None	446.5	254.5	192.0	280.9	124.1	156.8	33.18	5.47	3.44	2.03	55.4	30.7	1.05	.39	15.9	81.8
Winchendon <sup>4</sup>	Tanks	291.0	267.0	24.0	120.0	104.5	15.5	23.05	2.72	2.06	.66	29.2	24.2	2.18	1.35	6.4	—
WORCESTER <sup>2</sup>	Tanks <sup>3</sup>	492.0	402.0	90.0	190.0	132.0	58.0	16.20	—	—	—	85.5	55.3	20.00	11.20	—	—

<sup>1</sup>Six Samples.

<sup>2</sup>Analyses from local laboratory.

<sup>3</sup>Imhoff.

<sup>4</sup>Four samples.

<sup>5</sup>Five Samples.

TABLE NO. 3.—*Efficiency of Settling Tanks and Other Forms of Preliminary Treatment as Indicated by the Foregoing Tables.*

[Parts in 1,000,000]

CITY OR TOWN	Form of Preliminary Treatment	SUSPENDED SOLIDS			TOTAL ALBUMINOID AMMONIA			OXYGEN CONSUMED			FATS <sup>1</sup>		CHLORINE	
		Raw Sewage	Settled or treated Sewage	Per Cent removed	Raw Sewage	Settled or treated Sewage	Per Cent removed	Raw Sewage	Settled or treated Sewage	Per Cent removed	Raw Sewage	Settled or treated Sewage	Raw Sewage	Settled or treated Sewage
BROCKTON	Tanks	204.0	97.0	52	9.50	7.60	20	139.2	113.8	18	168.1	62.0	88.5	86.8
Clinton	Basins	318.7	40.0	87	8.57	3.84	55	91.2	40.4	56	55.3	55.3	55.3	44.7
Easthampton	Tanks	212.0	108.0	49	7.35	5.42	26	82.7	62.1	25	92.5	32.1	56.3	46.3
Fitchburg	Tanks <sup>2</sup>	181.2	30.4	83	5.60	3.12	44	63.7	38.5	40	101.2	48.5	51.6	36.4
Frammingham <sup>3</sup>	Tanks <sup>2</sup>	254.8	57.8	77	7.13	4.73	34	78.1	48.8	38	—	—	57.4	59.8
Franklin	Tanks	187.0	40.4	78	7.36	2.69	63	56.8	29.5	48	—	—	24.3	55.5
GARDNER (Templeton Area)	Tanks	223.1	67.8	70	10.06	4.65	54	81.6	41.1	50	89.6	36.1	57.3	44.6
Hopedale	Tanks	200.0	78.0	61	7.48	2.95	61	84.7	32.4	62	—	—	34.1	31.4
Hudson	Tanks	211.2	92.6	56	9.82	5.51	44	82.8	47.4	43	93.7	57.3	59.5	47.1
Marion	Tanks	332.8	96.8	71	4.20	2.21	47	78.7	35.3	55	—	—	32.1	38.0
MALBOROUGH	Tanks	153.7	90.7	41	7.33	5.68	22	70.8	63.9	10	70.7	51.8	49.9	51.5
Maynard	Tanks <sup>2</sup>	416.9	33.1	92	13.37	3.87	71	104.5	39.0	63	—	—	47.6	43.7
Millford	Tanks	244.7	47.1	81	6.70	3.87	42	53.8	39.2	27	—	—	41.5	49.6
Millford	Tanks <sup>2</sup>	244.7	38.1	84	6.70	3.08	54	53.8	31.7	41	—	—	41.5	41.7
North Attleborough	Tanks	135.0	38.3	72	3.05	2.26	26	35.7	26.0	27	—	—	24.8	23.6
Northbridge	Tanks	152.5	34.9	77	7.32	2.51	66	55.5	23.4	58	—	—	33.9	23.0
Southbridge	Tanks	273.6	78.6	71	10.27	5.06	51	96.7	55.5	43	147.1	59.8	46.5	38.3
Winchendon	Tanks	179.0	24.0	78	4.41	2.72	38	37.3	29.2	22	—	—	30.9	40.1
WORCESTER	Tanks <sup>3</sup>	103.0	90.0	58	—	—	—	150.5	85.5	43	—	—	70.5	70.9

<sup>1</sup>Fats determined in about 51 per cent of samples.<sup>2</sup>Comparatively small quantity of sewage from Saxonville not used in determining the efficiency of these tanks.<sup>3</sup>Inhoff.

TABLE NO. 4 — *Average Results of the Analyses of Monthly Samples of Sewage applied to the Trickling Filters at Brockton, Fitchburg, Maynard, Milford, and Worcester, and their Effluents, etc., Per Cent Removed, etc.*

[Parts in 1,000,000]

*Brockton*<sup>1</sup>

	RESIDUE ON EVAPORATION						AMMONIA				Chlorine	NITROGEN AS —		OXYGEN CONSUMED				Dissolved Oxygen	REMARKS
	TOTAL RESIDUE			LOSS ON IGNITION			Free	ALBUMINOID				Nitrates	Nitrites	Total	Dissolved	Suspended			
	Total	Dissolved	Suspended	Total	Dissolved	Suspended													
Settled sewage as applied to trickling filter.	557.0	460.0	97.0	264.0	188.0	76.0	34.5	7.6	6.1	1.5	86.9	.092	.295	113.8	83.1	30.7	0.1	Trickling filter has an area of 2.0 acres and a depth of 10 feet of stone from 1.5 to 3 inches in size.	
Effluent from trickling filter.	488.0	420.0	68.0	194.0	146.0	48.0	16.9	12.1	10.3	1.8	92.3	13.677	.451	54.5	29.9	24.6	6.3	One half of filter used alternately. The average rate of operation was about 1,362,000 gallons per acre per day.	
Per cent removed	12	9	30	27	22	37	51	—	—	—	—	—	—	52	64	20	—	Period of sedimentation averaged about 1.55 hours. Tanks cleaned 49 times.	
Settled effluent from trickling filter.	464.0	420.0	44.0	178.0	148.0	30.0	16.2	11.5	10.6	0.9	93.0	15.141	.487	46.9	28.7	18.2	5.8		
Per cent removed by secondary settling tank.	5	0	35	8	—	38	4	5	—	50	—	—	—	14	4	26	—		
Per cent removed by trickling filter and secondary settling tank.	17	9	55	33	21	61	53	—	—	40	—	—	—	59	65	41	—		

<sup>1</sup> Analyses from laboratory at Brockton.



TABLE No. 4.—Average Results of the Analyses of Monthly Samples of Sewage applied to the Trickling Filters at Brockton, Fitchburg, Maynard, Milford and Worcester, and their Effluents, etc., Per Cent Removed, etc.—Continued.  
 [Parts in 1,000,000]  
 Fitchburg

	RESIDUE ON EVAPORATION						AMMONIA				Chlorine	NITROGEN AS —		OXYGEN CONSUMED		Kjeldahl Nitrogen	Fats	REMARKS
	TOTAL RESIDUE			LOSS ON IGNITION			Free	ALBUMINOID				Nitrates	Nitrites	Unfiltered	Filtered			
	Total	Dissolved	Suspended	Total	Dissolved	Suspended												
Imhoff tank effluent as applied to trickling filter.	303.6	273.2	30.4	136.0	113.2	22.8	24.24	3.12	2.55	.57	—	—	38.5	30.7	8.5	32.1	Trickling filter has an area of 2.14 acres and a depth of 10 feet of stone from 1 to 3 inches in size.	
Effluent from trickling filter.	310.4	261.6	48.8	134.0	104.0	30.0	6.54	1.70	.76	.94	15.844	.257	21.3	13.3	4.4	—	The average rate of operation was about 1,613,000 gallons per acre per day for area used (1.86 acres).	
Per cent removed	—	4	—	1	8	—	73	46	70	—	—	—	45	57	48	—	Period of sedimentation about 6.5 hours. Tanks cleaned 8 times.	
Settled effluent from trickling filter as discharged to Nashua River.	309.6	268.0	41.6	128.0	100.0	28.0	6.90	1.67	.84	.83	16.040	.307	19.7	11.6	4.7	—		
Per cent removed by secondary settling tanks.	.25	—	15	4	4	7	—	2	—	12	—	—	8	13	—	—		
Per cent removed by trickling filter and secondary settling tanks.	—	2	—	6	12	—	72	46	67	—	—	—	49	62	45	—		

TABLE No. 4.—Average Results of the Analyses of Monthly Samples of Sewage applied to the Trickling Filters at Brockton, Fitchburg, Maynard, Milford and Worcester, and their Effluents, etc., Per Cent Removed, etc.—Continued.  
 (Parts in 1,000,000)  
 Maynard

	RESIDUE ON EVAPORATION						AMMONIA				NITROGEN AS —		OXYGEN CONSUMED		Kjeldahl Nitrogen	Fats	REMARKS
	TOTAL RESIDUE			LOSS ON IGNITION			Free	ALBUMINOID			Nitrates	Nitrites	Unfiltered	Filtered			
	Total	Dissolved	Suspended	Total	Dissolved	Suspended											
Innoff tank effluent as applied to trickling filter.	317.6	284.5	33.1	155.1	129.4	25.7	47.89	3.87	2.63	1.24	—	—	39.0	30.7	8.4	Trickling filter has an area of .25 of an acre and a depth of 7 feet of stone from 1½ to 2½ inches in size. The average rate of operation was about 312,000 gallons per acre per day.	
Effluent from trickling filter.	438.9	382.5	56.4	218.4	182.0	36.4	15.86	2.18	1.14	1.04	.162	16.523	24.8	15.9	5.1		
Per cent removed	—	—	—	—	—	—	67	44	57	16	—	—	36	48	39		
Settled effluent from trickling filter as discharged to Asabet River.	410.7	379.4	31.3	192.2	172.5	19.7	20.81	1.79	1.22	.57	.256	18.721	19.8	17.5	3.9		
Per cent removed by secondary settling tank.	6	.8	45	12	5	46	—	18	—	45	—	—	20	—	24	Period of sedimentation about 18.5 hours.	
Per cent removed by trickling filter and secondary settling tank	—	—	5	—	—	23	57	54	54	54	—	—	49	43	54	Tanks cleaned 2 times.	

TABLE No. 4.—Average Results of the Analyses of Monthly Samples of Sewage applied to the Trickling Filters at Brockton, Fitchburg, Maynard, Milford and Worcester, and their Effluents, etc., Per Cent Removed, etc.—Continued.  
[Parts in 1,000,000]  
Milford

	RESIDUE ON EVAPORATION						AMMONIA				Chlorine		NITROGEN AS —		OXYGEN CONSUMED		Kjeldahl Nitrogen	Fats	REMARKS
	TOTAL RESIDUE			LOSS ON IGNITION			Free	ALBUMINOID			Nitrates	Nitrites	Unfiltered	Filtered					
	Total	Dissolved	Suspended	Total	Dissolved	Suspended													
Inhoff tank effluent as applied to trickling filter.	333.8	295.7	38.1	140.0	109.3	30.7	30.07	3.08	2.09	.99	41.7	1.322	.177	31.7	22.0	6.8	-	Trickling filter has an area of .28 of an acre and a depth of 6 feet of stone from 1 to 1¾ inches in size.	
Effluent from trickling filter.	366.5	317.3	49.2	156.8	117.2	39.6	10.09	1.92	.77	1.15	42.7	13.996	.158	20.3	11.4	4.4	-		
Per cent removed	-	-	-	-	-	-	66	38	63	-	-	-	-	36	48	35	-		
Settled effluent from trickling filter as discharged to Charles River.	362.1	325.8	36.3	151.8	121.3	30.5	10.21	1.65	.69	.96	44.1	13.876	.175	17.9	10.6	3.8	-		
Per cent removed by secondary settling tank.	1	-	26	3	-	23	-	14	10	17	-	-	-	12	7	14	-		
Per cent removed by trickling filter and secondary settling tank.	-	-	5	-	-	7	66	46	67	3	-	-	-	44	52	44	-		



TABLE No. 4.—Average Results of the Analyses of Monthly Samples of Sewage applied to the Trickling Filters at Brockton, Fitchburg, Maynard, Milford and Worcester, and their Effluents, etc., Per Cent Removed, etc.—Concluded.  
[Parts in 1,000,000]  
Worcester<sup>1</sup>

	RESIDUE ON EVAPORATION						ORGANIC NITROGEN				NITROGEN AS —		OXYGEN CONSUMED		Kjeldahl Nitrogen	Fats	REMARKS
	TOTAL RESIDUE			LOSS ON IGNITION			Total	Dissolved	Suspended	Nitrates	Nitrites	Unfiltered	Filtered				
	Total	Dissolved	Suspended	Total	Dissolved	Suspended											
Inhoff tank effluent as applied to trickling filters.	492.0	402.0	90.0	190.0	132.0	58.0	7.53	5.36	2.17	70.9	—	—	85.5	55.3	—	Trickling filters have an area of 13.68 acres and a depth of 10 feet of stone from 1¼ to 3 inches in size.	
Effluent from trickling filters.	496.0	393.0	103.0	179.0	132.0	47.0	5.06	1.68	3.38	71.2	12.22 <sup>2</sup>	—	60.1	18.2	—	The average rate of operation was about 1,390,000 gallons per acre per day.	
Per cent removed	—	2	—	6	0	19	33	68.7	.56	—	—	—	30	67	—	Period of sedimentation averaged about 3 hours.	
Settled effluent from trickling filters as discharged to Blackstone River.	438.0	398.0	40.0	148.0	129.0	19.0	3.08	1.69	1.39	71.7	12.49 <sup>2</sup>	—	34.9	17.8	—		
Per cent removed by secondary settling tanks.	12	—	61	17	2	60	39	—	.59	—	—	—	42	2	—		
Per cent removed by trickling filters and secondary settling tanks.	11	1	56	22	2	67	59	68	36	—	—	—	59	68	—		

<sup>1</sup>Analyses from laboratory at Worcester.

<sup>2</sup>Nitrates and nitrites combined.

TABLE NO. 5.—Average Results of Analyses of Monthly Samples of Effluent from Sand Filters

[Parts in 1,000,000]

CITY OR TOWN	Free Ammonia	Total Albuminoid Ammonia	Chlorine	NITROGEN AS —		Iron
				Nitrates	Nitrites	
ATTLEBORO <sup>1</sup>	4.72	.664	32.8	10.663	.354	.33
Clinton <sup>2</sup>	11.16	.511	40.7	2.304	.081	13.76
Concord <sup>1</sup>	.54	.239	24.8	13.440	.104	.31
Easthampton <sup>1</sup>	6.36	.524	33.0	12.496	.061	1.95
Frammingham (new beds) <sup>3</sup>	13.57	.736	50.5	12.281	.077	6.83
Frammingham (old beds)	16.23	.770	45.7	7.180	.082	7.07
Franklin <sup>1</sup>	11.49	.812	38.3	1.757	.083	3.27
GARDNER (Gardner Area) <sup>4</sup>	28.15	1.147	54.4	4.573	.283	7.04
GARDNER (Templeton Area) <sup>2</sup>	29.48	1.076	48.0	2.640	.404	10.31
Hopedale <sup>2</sup>	9.68	.476	31.4	22.275	.023	.16
Hudson	23.00	1.365	44.8	6.260	.115	9.61
Leicester <sup>1</sup>	13.17	1.075	30.0	12.068	.397	.62
Marion <sup>5</sup>	1.26	.188	35.9	10.760	.073	.66
MARLBOROUGH <sup>2</sup>	13.71	.480	43.0	4.301	.111	4.74
Milford	27.07	.712	50.0	1.923	.093	7.37
Natick	30.29	1.866	51.7	.659	.006	8.29
North Attleborough <sup>1</sup>	5.25	.216	22.4	3.586	.147	3.22
Northbridge	2.43	.256	24.4	11.612	.205	1.14
PITTSFIELD <sup>2</sup>	19.51	2.556	26.4	.435	.029	4.43
Southbridge <sup>4</sup>	30.57	.793	41.8	.361	.003	8.61
Spencer	9.35	.268	27.9	.646	.008	15.98
Stockbridge <sup>2</sup>	.85	.311	18.1	7.611	.111	1.66
Westborough <sup>2</sup>	5.72	.567	40.2	11.841	.186	2.34
Winchendon <sup>4</sup>	2.79	.156	22.9	6.062	.261	.83

<sup>1</sup>Six samples.<sup>2</sup>Regular samples from two or more underdrains in one average.<sup>3</sup>Beds constructed in 1924. Sewage passes through Imhoff tanks.<sup>4</sup>Four samples.<sup>5</sup>Five samples.

TABLE NO. 6.—Efficiency of Sand Filters (Per Cent of Free and Albuminoid Ammonia Removed)

[Parts in 1,000,000]

CITY OR TOWN	FREE AMMONIA			TOTAL ALBUMINOID AMMONIA			CHLORINE		Rate of Operation <sup>1</sup> with Even Distribution (Gallons per Acre per Day)
	Applied Sewage	Effluent	Per Cent Removed	Applied Sewage	Effluent	Per Cent Removed	Applied Sewage	Effluent	
ATTLEBORO	26.13	4.72	82	4.05	.664	84	30.2	32.8	66,000
Clinton	24.56	11.16	55	3.84	.511	87	44.7	40.7	56,000
Concord	9.47	.54	94	1.29	.239	81	18.7	24.8	93,000
Easthampton	48.96	6.36	87	5.42	.524	90	46.3	33.0	—
Frammingham (new beds) <sup>2</sup>	42.18	13.57	68	4.73	.736	84	59.8	50.5	45,000
Frammingham (old beds)	43.33	16.23	63	7.80	.770	90	54.3	45.7	—
Franklin	25.26	11.49	55	2.69	.812	70	55.5	38.3	74,000
GARDNER (Gardner Area)	73.80	28.15	62	14.95	1.147	92	64.7	54.4	—
GARDNER (Templeton Area)	40.40	29.48	27	4.65	1.076	77	44.6	48.0	—
Hopedale	32.35	9.68	70	2.95	.476	84	31.4	31.4	—
Hudson	49.00	23.00	53	5.51	1.365	75	47.1	44.8	71,000
Leicester	26.43	13.17	58	4.18	1.075	74	31.8	30.0	—
Marion	16.40	1.26	92	2.21	.188	91	38.0	35.9	80,000
MARLBOROUGH	40.40	13.71	66	5.68	.480	92	51.5	43.0	53,000
Milford	38.27	27.07	29	3.87	.712	82	49.6	50.0	51,000
Natick	35.35	30.29	14	6.94	1.866	73	39.4	51.0	63,000
North Attleborough	15.16	5.25	65	2.26	.216	90	23.6	22.4	91,000
Northbridge	20.89	2.43	88	2.51	.256	90	23.0	24.4	66,000
PITTSFIELD	38.37	19.51	49	6.55	2.556	61	39.5	26.4	113,000
Southbridge	41.97	30.57	27	5.06	.793	84	38.3	41.8	74,000
Spencer	30.40	9.35	69	10.91	.268	98	31.6	27.9	—
Stockbridge	25.85	.85	97	3.05	.311	90	16.6	18.1	—
Westborough	33.18	5.72	83	5.47	.567	90	24.9	40.2	43,000
Winchendon	23.05	2.79	88	2.72	.156	94	40.1	22.9	—

<sup>1</sup>See also Table No. 7.<sup>2</sup>Beds constructed in 1924. Sewage passes through Imhoff tanks

TABLE No. 6 A.—Summary of Efficiency of Sewage Disposal Works. (Per Cent Removal from Raw Sewage to Final Effluent).

[Parts in 1,000,000]

CITY OR TOWN	SUSPENDED SOLIDS				FREE AMMONIA				TOTAL ALBUMINOID AMMONIA				OXYGEN CONSUMED				CHLORINE			Rate of Operation with Even Distribution. (Gallons per Acre per Day)
	Raw Sewage	Settled Sewage	Per Cent Removal	Final Effluent	Per Cent Removal	Settled Sewage	Per Cent Removal	Final Effluent	Per Cent Removal	Raw Sewage	Settled Sewage	Per Cent Removal	Raw Sewage	Settled Sewage	Per Cent Removal	Raw Sewage	Settled Sewage	Effluent		
ATTLEBORO <sup>1</sup>	108.3	—	—	4.72	82	4.05	7.60	.664	84	48.6	113.8	18	30.2	—	—	—	32.8	66,000		
BROCKTON <sup>1, 2</sup>	204.0	97.0	52	6.20	63	9.50	3.84	.511	94	134.2	40.4	55	88.5	86.9	—	18	40.7	1,362,000		
CLINTON <sup>1, 3</sup>	19.9	40.0	87	11.16	95	1.29	5.42	.239	81	13.8	62.1	25	55.3	44.7	—	56	24.8	56,000		
CONCORD <sup>1</sup>	19.9	—	—	0.54	95	1.29	5.42	.239	81	13.8	62.1	25	55.3	44.7	—	56	24.8	56,000		
EASTHAMPTON <sup>1, 3</sup>	212.0	108.0	49	6.36	87	7.35	5.42	.239	93	82.7	—	—	56.3	—	—	25	33.0	93,000		
FRITCHBURG <sup>1, 5</sup>	181.2	30.4	83	6.90	70	5.60	3.12	1.670	70	63.7	38.5	40	51.6	36.4	—	40	35.3	1,613,000		
Framingham (new beds) <sup>1, 4</sup>	254.8	57.8	77	13.57	67	7.13	4.73	.736	90	78.1	48.8	38	57.4	59.8	—	38	50.5	45,000		
Framingham (old beds) <sup>1, 4</sup>	288.7	—	—	16.23	63	7.80	—	.770	90	92.6	—	—	54.3	—	—	48	45.7	45,000		
FRANKLIN <sup>1, 3</sup>	187.0	40.4	78	11.43	65	7.36	2.69	.812	89	56.8	29.5	48	24.3	55.5	—	48	38.3	74,000		
GARDNER (Gardner Area) <sup>1</sup>	336.5	—	—	28.15	62	14.95	—	1.147	92	97.0	—	—	64.7	—	—	—	54.4	—		
GARDNER (Templeton Area) <sup>1, 13</sup>	223.1	67.8	70	29.48	55	10.06	4.65	1.076	89	81.6	41.1	50	57.3	44.6	—	—	48.0	—		
Hopedale <sup>1, 3</sup>	200.0	78.0	61	9.68	72	7.48	2.95	.476	94	84.7	32.4	62	34.1	31.4	—	—	31.4	—		
Hudson <sup>1, 3</sup>	211.2	92.6	56	23.00	62	9.82	5.51	1.365	84	82.8	47.4	43	59.5	47.1	—	—	44.8	71,000		
Leicester <sup>1, 3</sup>	69.7	—	—	13.17	58	4.18	—	1.075	74	46.9	—	—	31.8	—	—	—	30.0	—		
Marion <sup>1, 3</sup>	332.8	96.8	71	1.26	87	4.20	2.21	1.188	96	78.7	35.3	55	32.1	38.0	—	—	35.9	80,000		
MARLBOROUGH <sup>1, 3</sup>	153.7	90.4	41	13.71	57	7.33	5.68	.480	93	70.8	63.9	10	49.9	51.5	—	—	43.0	53,000		
Maynard <sup>1, 5</sup>	416.9	33.1	92	20.81	66	13.37	3.87	1.790	87	104.5	39.0	63	47.6	43.7	—	—	52.6	312,000		
Milford <sup>1, 5</sup>	244.7	47.1	81	39.93	38.27	4	27.07	.712	89	53.8	39.2	27	41.5	49.6	—	—	50.0	51,000		
Milford <sup>1, 5</sup>	244.7	38.1	84	10.21	74	6.70	3.08	1.650	75	53.8	31.7	41	41.5	41.7	—	—	44.1	—		
Natick <sup>1</sup>	211.1	—	—	30.29	17	6.94	—	1.866	73	49.8	—	—	39.4	—	—	—	51.7	63,000		
North Attleborough <sup>1, 3</sup>	135.0	38.3	72	5.25	70	3.05	2.26	.216	90	35.7	26.0	27	24.8	26.0	—	—	22.4	91,000		
Northbridge <sup>1, 3</sup>	152.5	34.9	77	2.43	95	7.32	2.51	.256	97	55.5	23.4	58	33.9	23.0	—	—	24.4	66,000		
PATRICK <sup>1</sup>	190.7	—	—	19.51	49	6.55	—	2.556	61	63.6	—	—	39.5	—	—	—	26.4	113,000		
Southbridge <sup>1, 3</sup>	273.6	78.6	71	30.57	25	10.27	5.06	.703	92	96.7	55.5	43	46.5	38.3	—	—	41.8	74,000		
Spencer <sup>1</sup>	503.7	—	—	9.35	69	10.91	—	.268	98	129.6	—	—	31.6	—	—	—	27.9	—		
Stockbridge <sup>1</sup>	79.5	—	—	0.85	97	3.05	—	.311	90	35.9	—	—	16.6	—	—	—	18.1	—		
Westborough <sup>1</sup>	192.0	—	—	5.72	83	5.47	—	.567	90	55.4	—	—	24.9	—	—	—	40.2	—		
Winchendon <sup>1, 3</sup>	109.0	24.0	78	2.79	82	4.41	2.72	.156	96	37.3	29.2	22	30.9	40.1	—	—	22.9	43,000		
WORCESTER <sup>2, 4, 5</sup>	173.0	90.0	49	3.50	79	150.5	—	85.5	43	70.5	85.5	43	70.5	70.9	—	—	71.7	1,390,000		

<sup>1</sup> Sand filters.

<sup>2</sup> Analyses from local laboratory.

<sup>3</sup> Settling tanks.

<sup>4</sup> Imhoff tank.

<sup>5</sup> Trickling filters.

<sup>1</sup>Sand filters.<sup>2</sup>Analyses from local laboratory.<sup>3</sup>Settling tanks.<sup>4</sup>Imhoff tank.<sup>5</sup>Trickling filters.



TABLE No. 7.—*Extent of Sewerage Works, Rate of Flow, and Rate of Operation of Filters*

CITY OR TOWN	Popula- tion, Census of 1930	Approxi- mate Length of Sanitary Sewers (Miles)	Approxi- mate Number of House Con- nections	ESTIMATED QUANTITY OF SEWAGE TREATED (GALLONS PER DAY)			Estimated Quantity of Sewage per Con- nection	Net Area of Filter Beds (Acres)	Estimated Rate of Operation with Even Dis- tribution (Gallons per Acre per Day)
				Average for Year	Average for Month of Maximum Flow	Average for Month of Minimum Flow			
ATTLEBORO	21,769	37.30	1,815	1,024,000	1,555,000	565,000	564	15.50	66,000
BROCKTON	63,797	105.60	8,668	3,302,000 <sup>1</sup>	4,212,000	2,241,000	382	—	56,000
Clinton	12,817	24.92	1,920	1,460,000 <sup>2</sup>	1,764,000	932,000	760	26.23	93,000
Concord	7,477	17.46	726	509,000	752,000	365,000	701	5.48	—
Easthampton	11,323	24.43	1,271	—	—	—	—	2.20	—
FITCHBURG	40,692	66.61	—	3,000,000	4,250,000	1,950,000	—	—	—
Framingham	22,210	42.40	3,533	1,300,000	1,883,000	837,000	368	29.12	45,000
Franklin	7,028	14.49	843	240,000	363,000	113,000	285	3.24	74,000
GARDNER	19,399	35.64	2,507	—	—	—	—	14.00	—
Hopedale	2,973	7.08	370	144,000 <sup>3</sup>	240,000	86,000	389	3.79	38,000
Hudson	8,469	14.61	1,140	640,000	902,000	456,000	562	9.00	71,000
Marion	4,114	4.14	220	154,000	301,000	81,000	700	1.93	80,000
MARLBOROUGH	15,587	36.81	2,645	1,070,000	1,445,000	545,000	405	20.19	53,000
Maynard	7,156	8.03	255	78,000	111,000	54,000	306	—	—
Milford	14,741	25.41	1,791	473,000 <sup>4</sup>	620,000	229,000	264	9.30	51,000
Nantucket	3,678	20.00	1,600	686,000 <sup>5</sup>	875,000	504,000	429	4.00	172,000
Natick	13,589	14.07	1,666	761,000	1,400,000	441,000	457	12.00	63,000
North Attleborough	10,197	17.99	1,049	795,000	900,000	607,000	758	8.75	91,000
Northbridge	9,713	15.93	975	790,000	960,000	640,000	810	12.00	66,000
Pittsfield	49,677	80.20	6,766	4,635,000 <sup>2</sup>	6,117,000	3,664,000	685	41.15	113,000
Southbridge	14,264	—	—	921,000	1,084,000	763,000	—	12.50	74,000
Westborough	6,409	9.11	610	284,000	585,000	132,000	466	6.62	43,000
Winchendon	6,202	9.29	306	—	—	—	—	4.00	—
WORCESTER	195,311	237.99 <sup>6</sup>	—	19,670,000	26,940,000	14,330,000	—	—	—

<sup>1</sup>Includes an average of 2,726,000 gallons per day to trickling filter and 576,000 gallons to sand filters.

<sup>2</sup>Entire quantity of sewage not treated.

<sup>3</sup>New development not included in average.

<sup>4</sup>Records questionable. Amount to sand filters only.

<sup>5</sup>No underdrains. Filters drain direct to ocean.

<sup>6</sup>Includes 70.1 miles of combined sewers.

TABLE No. 8—General Features

CITY OR TOWN	Year of Construction of and Additions to Works	Depth of Under-drains (Feet)	Distance Apart of Under-drains (Feet)	Filtering Material	Attention given to Disposal Works
ATTLEBORO	1912, 1913	4-7	35	Excellent sand and gravel; found in place.	One man all the time; others when necessary.
BROCKTON	1893, 1905, 1908, 1912	5.5	30	Good sand and gravel; found in place.	One chemist in charge, foreman, day and night man; more when necessary.
Clinton	1898, 1899	8	60-70	Good sand and gravel; found in place.	Two men all the time; others when necessary.
Concord	1899, 1928	none	—	Good sand underlain with gravel; found in place.	One man once a day.
Easthampton	1908	3.5	20-40	Good sand and gravel; largely found in place.	One man all the time; others when necessary.
FITCHBURG	1914	—	—	Trickling filter—10 feet deep.	Chemist in charge; 1 foreman, 1 day and 2 night men.
Framingham	1890, 1924	—	—	Good sand and gravel.	One man all the time; others when necessary.
Franklin	1915	4.5	26	Good sand and gravel.	Very little attention; one man once in a while.
GARDNER (Gardner Area)	1891	5	20	Good sand; handled in construction.	One man all the time; others when necessary.
GARDNER (Templeton Area)	1901, 1909, 1931	3-4	20-30	Coarse sand; handled in construction.	One man all the time; others when necessary.
Hopedale	1900, 1923	3	35-60	Good material—sand and gravel.	One man all the time; others when necessary.
Hudson	1904, 1910	5-6	50-100	Good sand and gravel; found in place.	One man all the time; others when necessary.
Leicester	1894, 1928	4	8	Mostly good sand; handled in construction.	Very little attention.
Marion	1906, 1930	5	—	Mostly good sand; pockets of fine sand and some ledge; largely found in place.	One man every day in summer, every other day in winter.
MARLBOROUGH	1891, 1908, 1909, 1910, 1911	4.5-6	30-50	Rather fine sand; found in place.	One man all the time; others when necessary.
Maynard	1929	—	—	Trickling filter, 7 feet deep.	One man all the time.
Milford	1907, 1924	5	40	Rather fine sand; found in place; trickling filter.	One man every day; others when necessary.
Nantucket	1930	—	—	Good sand and gravel found in place.	One man when necessary.
Natick	1896	6	36	Sand of good quality, but stratified; found in place.	One man all the time; others when necessary.
North Attleborough	1909, 1910, 1931	5-6.5	55	Coarse sand and gravel; found in place.	One man every day; others when necessary.
Northbridge	1906, 1907, 1920	4	50-75	Coarse sand and gravel; mostly handled.	Two men all the time; others when necessary.
Norwood	1909, 1918, 1923, 1924	4-6	40	Good sand and gravel; partly handled.	One man all the time; others when necessary.
PITTSFIELD	1901, 1915	4	35	Good sand; mostly found in place.	Two men all the time; others when necessary.
Southbridge	1908, 1925, 1926	4	40	Fair sand and gravel; considerable quantity handled, some found in place.	One man part of every day.
Spencer	1897, 1923	1	—	Good sand and gravel; largely found in place.	One man all the time; others when necessary.
Stockbridge	1899, 1921, 1922	{ 3-4.5 3-4.5	23	Sand filters, good quality sand.	One man all the time.
Westborough	1892, 1911	5	30	Irrigation area, rather fine sand.	One man all the time.
Winchendon	1928	5	30-40	Good sand and gravel; handled in construction.	One man all the time; others when necessary.
WORCESTER	1898 <sup>2,3</sup> , 1925	4-6	35-50	Good sand and gravel; found in place. Trickling filters, sand area not in use.	One man part time. Chemist in charge; several men all the time.

Only three beds underdrained.

2Year of first construction of sand filters. Many additions

3Sedimentation tanks and sand beds abandoned June, 1925. and secondary tanks installed.

Imhoff tanks, trickling filters

## EXAMINATION OF SEWER OUTLETS DISCHARGING INTO THE SEA

No special examinations were made of the various deep sea sewer outlets during the year, and no complaints were made concerning them with the exception of the small outlet from the Brant Rock section of the town of Marshfield where a further extension of the sewer into deeper water is necessary. The time for the extension of this sewer was extended by the Department on April 13, 1932, until June 15, 1933.

## EVERETT AND CHELSEA ODORS

Under the provisions of Chapter 40 of the Resolves of 1932 the Department of Public Health was directed to investigate the causes of offensive odors, fumes and gases emanating from industrial processes and other sources in the cities of Everett and Chelsea and to determine the effect, if any, upon the public health and comfort. The results of the investigation of this Department are presented in House Bill No. 1171 of the Legislature of 1933.

## INVESTIGATIONS RELATIVE TO SHELLFISH

A large number of applications and petitions have been received during the year relative to the removal of restrictions on the taking of shellfish from various portions of the seacoast, and after extensive investigations restrictions were removed during parts of the year from certain portions of Hingham Harbor, Quincy Bay, Long Beach, Swansea, and the Apponaganset River in Dartmouth.

The shellfish chlorinating plant at Newburyport has been continued in operation throughout the year, the raw product being obtained not only from Newburyport Harbor but from points as far distant as Winthrop and Quincy Bay. The proper supervision by special wardens of the taking of shellfish from points in and about Boston Harbor and the transportation to Newburyport is a very difficult problem, and representatives of the Department held several conferences during the year with officials of the Division of Fisheries and Game in regard to this matter for the purpose of formulating a plan which would prevent short circuiting of contaminated shellfish to the markets.

The plant of the Pioneer Fisheries Company at Plymouth was in operation only a part of the year.

These two plants have been operated under the general oversight of the Department, and daily analyses indicate satisfactory results. Conferences were under way with the Health Department of the City of New York toward the end of the year to see if that department would accept chlorinated shellfish. This product has been accepted, provisionally, by the United States Public Health Service.

Certain changes were made on March 8, 1932, in the rules and regulations relative to the operation of shellfish treatment plants by the Department and also in regard to the issuing of shellfish certificates on the same date.

The issuing of shippers' certificates which was transferred to this division during 1931 has been continued during the year, some 171 shippers' certificates having been issued, and a large number of shellfish bed certificates have also been issued.



## REPORT OF THE DIVISION OF TUBERCULOSIS

ALTON S. POPE, M.D., *Director*

I have the honor to submit the thirteenth annual report of the Division of Tuberculosis. This report consists of an outline of the major activities of the Division for the fiscal year ending November 30, 1932, together with certain developments in policy in the field of tuberculosis control, both in the Department and the State at large.

A death rate under 50 marks a new milestone in the decline of pulmonary tuberculosis in Massachusetts. During 1932 only 2,041 deaths were reported, equivalent to a death rate of 47.5 per 100,000. This represents a decrease of over 50 per cent in the tuberculosis mortality rate since 1919, the most rapid rate of decline in the history of the State. As yet there is no evidence that the economic crisis of the past three years has affected the morbidity or mortality from tuberculosis. This is no assurance, however, that the continuation of present living conditions or the advent of more acute privation or overcrowding may not result in such a rise in tuberculosis as occurred in most European countries during the late war.

## TUBERCULOSIS DEATHS AND DEATH RATES PER 100,000

*Massachusetts 1923-1932*

YEAR	PULMONARY		OTHER FORMS		TOTAL	
	Deaths	Rate	Deaths	Rate	Deaths	Rate
1923	3,062	75.7	528	13.0	3,590	90.4
1924	2,953	72.0	577	14.1	3,530	85.7
1925	2,883	69.3	576	13.9	3,459	83.4
1926	2,961	71.0	555	13.3	3,516	84.3
1927	2,774	66.2	429	10.2	3,203	76.4
1928	2,690	63.9	433	10.3	3,123	74.2
1929	2,561	60.5	361	8.5	2,922	69.1
1930	2,423	56.9	311	7.3	2,734	64.3
1931	2,306	53.9	248	5.8	2,554	59.7
1932	2,041	47.5	261	6.1	2,302	53.5

## STATE SANATORIA

During the year the four State Sanatoria have furnished 429,660 days treatment for 2,195 patients. Of these cases 1,142 were in the institutions at the beginning of the year and 1,053 represent new admissions. These cases were divided as follows: Rutland 698 cases of adult pulmonary tuberculosis; North Reading and Westfield 1,015 children with adult or childhood type of the disease; Lakeville 482 patients with extra-pulmonary forms of tuberculosis. 90 more patients were treated than last year and 687 more days treatment were provided. It is gratifying that in spite of economic pressure very few towns have withdrawn patients from our sanatoria during the year.

The per capita costs at the State Sanatoria show a substantial reduction from 1931. At Rutland the average cost was \$15.69; at North Reading \$16.21; at Westfield \$17.47; and at Lakeville \$18.14 per week. This saving of about 8 per cent is due entirely to the decrease in food prices, and the quality of medical service has been steadily improved.

With the opening of the new Employees' Building at the Westfield State Sanatorium in June, the immediate building program at the State Sanatoria was practically completed. Houses for the superintendents at Rutland and North Reading should be provided as soon as financial conditions permit, but it seems probable that the existing plants will meet the immediate demands for State sanatorium beds.

Since the completion of the building program it has been possible during the past year to devote special attention to the extension and improvement of medical service. At Rutland the new Medical and Surgical Building has made it possible to do all the routine surgical work of the institution on the grounds. Two hundred and twenty-eight operations were performed there during the year, and 20 cases were transferred to the Massachusetts General Hospital for major thoracic surgery. Approximately 40 per cent of all patients received pneumothorax, and an addi-

tional 10 per cent had some form of surgical collapse treatment. The installation of thoroughly up-to-date X-ray apparatus has been a great addition to the equipment of the sanatorium. A diagnostic consultation clinic, staffed from Rutland, which was established in Milford in October, 1930, has met with a very cordial response from the physicians of that part of the State. Such extra-mural work is, we believe, one of the most important functions of a sanatorium.

At Lakeville also there was a decided increase in the medical and surgical work performed. Our orthopedic consultant has made an extra visit every other week throughout the year. Total operations increased from 104 to 142, and plaster casts from 621 to 867. The daily average number of patients showed an increase of 13 from last year, and the average stay of patients rose from 416 to 506 days, on account of a larger proportion of orthopedic cases. Through the cooperation of the State Department of Education and our consultant in occupational therapy, it has been possible to arrange special courses and vocational guidance for patients in condition to profit by them. A Red Cross course in Home Hygiene, consisting of twenty-five lectures and demonstrations was completed by a class of twelve patients. The well equipped occupational therapy workshop has been in constant use and is of distinct educational and recreational value to ambulant patients of all ages.

During the year there has been an increase in the proportion of children under six at North Reading, from 23 to 32 per cent. This increase is most marked among children under three, and is taxing to capacity the quarters provided for infants and little children in the Admitting and Isolation Building. Improvements in diagnosis are bringing to our sanatoria an increasing proportion of children with serious tuberculous disease. It is especially gratifying that there has been a marked increase in the proportion of minimal stage pulmonary cases admitted, and a corresponding decrease in moderately advanced and advanced cases. This we believe can be credited to a great extent to the work of the Chadwick Clinics.

Under the Governor's Emergency Unemployment Act funds were made available for the construction of seven additional filter beds at North Reading. The construction of these beds has relieved a serious health menace and put the sewage disposal plant of the sanatorium in first class condition.

The new Employees' Building at Westfield which was opened in June is filling a real need at that institution. The new X-ray apparatus installed last spring is proving very satisfactory for the large amount of diagnostic work done at the institution. At Westfield as at North Reading a marked increase in the proportion of minimal pulmonary cases has been noted. During the year two conferences were held at Westfield with outside authorities on tuberculosis and in view of the very serious prognosis of pulmonary tuberculosis in children under 17 it was decided to use collapse therapy more extensively in such cases, as a supplement to extended bed rest. The very active out-patient department set a new record for the year with 2,016 examinations. Practically all of these patients were referred by their family physician or their local board of health. The sanatorium has continued to cooperate with the Hampden County Tuberculosis Association in conducting school tuberculosis clinics throughout the county.

Effective management and lower food prices have made possible savings of ten to fifteen per cent in maintenance costs at the State Sanatoria during the past year. What is more important, this has been accomplished without sacrificing the high grade of service necessary to make the treatment of tuberculosis effective.

#### PONDVILLE CANCER HOSPITAL

During the year 1,123 patients have been treated in the hospital. Of these 110 were in the house at the beginning of the year and 1,013 more were admitted. Of these 291 represent re-admissions. This is an increase of 106 over the number treated the previous year.

The average stay in the hospital was 44.04 days, essentially the same as for the preceding year. The average number of patients per day was 114.2, a remarkably effective use of beds considering there are only 115 in the hospital. The per capita cost for 1932 was \$40.73, a slight increase over last year due to the transfer of \$10,000 from general maintenance for the emergency construction of a steam main.

The past year has been marked by a phenomenal increase in the work of all departments of the hospital. With no additional beds over one hundred more patients were admitted than last year. The average attendance at the regular Thursday clinic jumped from 35 to 43, while total clinic visits increased from 2,805 to 3,501. The demands on the X-ray service have necessitated an extra visiting day by one of the roentgenologists. The increasing number of urological patients has made it imperative to hold a second weekly urological clinic with an assistant urologist. The appointment of a medical resident has helped to keep pace with the growing work of the hospital and to give adequate attention to the medical as well as surgical aspects of the work. The increasing operative work has made necessary the appointment of an experienced anesthetist. All facilities of the hospital are now being taxed to their limit and it is hoped that the urgently needed additions of wards and service building can soon be provided to meet the growing demands for the special service which Pondville supplies.

#### COUNTY SANATORIA

The opening of the new Middlesex County Sanatorium last year shows very strikingly the growing appreciation of high grade service to the tuberculous. Although the new hospital provides for more patients than the county had in all other sanatoria at the time it was immediately filled to capacity and still has a waiting list of some 80 patients. A very important service being given at the hospital is the examination of the family contacts of each patient admitted to the sanatorium. Approximately twenty per cent of such apparently well people who have been living in close contact with tuberculous patients have been found to have either the adult or childhood type of tuberculosis. The sanatorium is also furnishing diagnostic clinic service to the Nashoba Health District through the Ayer Community Memorial Hospital and to the City of Newton through the Newton Hospital.

Under authorization granted in Chapter 36, Acts of 1931, the Plymouth County Sanatorium was the first institution in the State to furnish extra-mural diagnostic service to a community in its district. On request from the City of Brockton the sanatorium is regularly furnishing the medical service for the city tuberculosis clinic. The result has been very satisfactory to both the city and the sanatorium, and the quality and quantity of work done in the clinic have been greatly improved.

The new Worcester County Sanatorium in West Boylston is practically completed and is expected to open early in January. This institution represents the best modern thought in tuberculosis hospital construction and will in every way be a credit to the county. Its opening will supply a long-felt need for additional sanatorium facilities in Worcester County.

During the year additions have been made providing for ten additional beds at the Barnstable County Sanatorium and four new beds at the Hampshire County Sanatorium. At Bristol County Sanatorium a full-time resident assistant physician has been added to the staff. At Hampshire County Sanatorium a safe and abundant water supply from a large well has been provided to replace the former unsatisfactory brook supply.

Marked progress in the treatment of tuberculosis has been made in the county as well as in state sanatoria. All the county institutions are now using pneumothorax to some extent and several have arranged to secure thoracic surgery for suitable cases.

An important development in the relationship of state and county sanatoria has been the formation of an Advisory Council on Tuberculosis to the Department of Public Health, consisting of the superintendents of the county and state sanatoria. This committee meets two or three times a year and while it has no official authority it has already proved of the greatest value in the working out of tuberculosis problems and policies which affect the whole State.

In the development of the hospitalization of tuberculosis in Massachusetts wide variations have occurred in the charges made to cities and towns for the care of their patients. In the state sanatoria the statutes require direct payment by the town of settlement of not less than actual cost, now \$17.50 per week. In the county sanatoria the direct charge to the town varies from \$9.10 to \$12.25 per week, the balance of the cost being assessed on the towns which constitute the hos-



pital district. As a result of these widely divergent rates patients are sometimes kept for months on the waiting list of one sanatorium while beds are vacant in another, to the detriment of the patient and the community.

Under Chapter 39 of the Resolves of 1932 the Director of Accounts and the Commissioner of Public Health were appointed as a committee to study and advise in regard to the costs and charges at state and county sanatoria. As a result of their investigations they are advising that the direct charges to cities and towns for tuberculosis patients for whom they are responsible in county and state sanatoria be uniform. They suggest that this charge be \$14 per week, or \$2 per day. The adoption of these recommendations by the Legislature would, we believe, result in freer and more effective use of our present sanatorium facilities with no additional cost to the taxpayers.

### SOCIAL SERVICE

Economic conditions during the past year have inevitably increased the difficulties of effective social work in all fields. This is especially true in tuberculosis where living conditions and nutrition may often be the deciding factors between recovery and relapse. In some instances financial pressure has resulted in premature withdrawals of patients from sanatoria, thereby increasing the social problems at home.

On account of the difficulties of making satisfactory home adjustments in the short time available after the worker was notified that the patient was ready for discharge we have changed our system of social investigations at our children's sanatoria. Under the present arrangement each case is referred to social service on admission. This gives our workers much more time to work out a solution of home problems and avoids the delays which sometimes occurred when the patient was not referred till near the end of his treatment.

Our social workers have continued regularly to attend staff conferences at the sanatoria. In this way they are brought more closely in contact with the problems of the patients in the institutions and find they can be of greater help to the superintendents. The consultation service established in the Nashoba District last year has been continued and is proving of distinct value to the local agencies.

During the year 649 home visits have been made; medical and social agencies have been contacted 1,675 times. The service has covered 122 cities and towns in the State.

### THE TEN-YEAR PROGRAM

Following is the summary of the eight years' work of the Chadwick Clinics:

Total school population of towns visited . . . . .	101,455
*Number given Von Pirquet test . . . . .	68,899
Number of reactors . . . . .	13,254
Number X-rayed . . . . .	13,396
Number examined . . . . .	3,865
Number contacts examined . . . . .	579
Number diagnosed as pulmonary tuberculosis . . . . .	48
Number diagnosed as pulmonary tuberculosis suspect . . . . .	39
Number diagnosed as hilum tuberculosis . . . . .	553
Number classified suspects . . . . .	2,086
Number cases of malnutrition . . . . .	84

\*12,937 of these were in high schools.

During the school year 1931-32 a total of 68,899 children were examined in the Chadwick clinics. The proportion of consents was the highest ever obtained in the clinic, 69 per cent in the grades and 62 per cent in high schools. The percentage of reactors to the tuberculin test showed a decline for the third successive year, being 17 per cent for the whole group of grade school pupils and 31 per cent for high school students. Forty-eight cases of pulmonary and 563 cases of hilum tuberculosis were found.

In the fall and early winter the clinic examined a large number of small towns in Southeastern Massachusetts and on the Cape, finishing with the city of New Bedford. During the winter it worked in some of the smaller cities around Boston and in the spring in the Southern Connecticut Valley.

## SUMMARY OF EIGHT YEARS' WORK

	Date	Number of Children examined	Number of Contacts examined	Number given Tuberculin Test	Number of Reactors	Per Cent of Reactors	Number of Children X-Rayed	Number of Cases of Pulmonary Tuberculosis	Per Cent of Pulmonary Cases of Number given Test	Number of Cases of Hilum Tuberculosis	Per Cent of Cases of Hilum of Number given Test	Number of Cases classified as Suspects
First year	1924-1925	10,648	1,612	10,016	2,927	29	3,008	31	.31	561	5.6	1,114
Second year	1925-1926	19,073	2,955	18,601	5,314	29	6,121 <sup>1</sup>	19	.1	621	3.3	1,399
Third year	1926-1927	19,527	2,367	19,194	5,188	27	6,338 <sup>1</sup>	29	.1	524	2.7	1,112
Fourth year <sup>2</sup>	1927-1928	26,177	913	26,052	7,219	28	7,909 <sup>1</sup>	8	.03	376	1.4	896
Fifth year	1928-1929	25,693	930	25,699	7,423	29	9,446 <sup>1</sup>	11	.04	415	1.6	848
Totals for first five years		101,118	8,777	99,562	28,071	28	32,822 <sup>1</sup>	98	.10	2,497	2.5	5,369
Sixth year <sup>3</sup>	1929-1930	2,459	309	49,379	11,298	23	11,277	26	.05	439	.9	1,065
Seventh year <sup>4</sup>	1930-1931	3,476	450	57,412	16,426	29	16,612	31	.05	409	.7	1,654
Eighth year <sup>5</sup>	1931-1932	3,865	579	68,899	13,254	19	13,396	48	.07	553	.8	2,086
Totals for eight years		110,918	10,115	275,252	69,049	25	74,107	203	.07	3,898	1.4	10,174

<sup>1</sup>This figure includes X-rays of Re-examinations, Summer Camp Children, Adults, and Special Requests.<sup>2</sup>The first three years an attempt was made to examine the contact cases and the children who were 10 per cent or more underweight.<sup>3</sup>These figures include the examination of 7,318 high school students.<sup>4</sup>These figures include the examination of 8,731 high school students.<sup>5</sup>These figures include the examination of 1,973 high school students.

The work of the Follow-Up Clinic has grown steadily with the accumulation of cases referred by the main clinic. During the year 6,297 children were examined, including some 500 new cases. Of the old cases 5,308 were found to be improved and 442 unimproved, 393 were recommended for summer camp and 90 for sanatorium care; 1,360 were discharged as needing no further follow-up.

On November 1, Dr. Paul Wakefield resigned as director of the Chadwick Clinic to accept the position of Superintendent of the Central Maine Sanatorium at Fairfield. The work of both clinics has been combined under the direction of Dr. Zacks, and Dr. Charles Gill has been appointed to the clinic as Field Supervisor.

#### SUBSIDY

The operation of the Middlesex County Sanatorium for the entire year, the addition of some fifty beds at the Belmont Hospital, Worcester, and re-approval of the Springfield Tuberculosis Hospital by the Department of Public Health have resulted in a large increase in subsidy claims for 1932. Last year the Department paid \$343,000 to cities and towns as subsidy for tuberculosis patients hospitalized in sanatoria approved by the State. This year \$404,250.74 will be required. Since this is one way in which the cost of hospitalization of the tuberculous is distributed over the State, the Department of Public Health has no desire to abolish the subsidy but does feel that it should be made conditional upon adequate diagnostic and follow-up service to the tuberculous in the community, for, until case finding and local service are materially improved, our excellent tuberculosis sanatoria cannot be used effectively nor economically.

### LAKEVILLE STATE SANATORIUM

#### RESIDENT OFFICERS

LEON A. ALLEY, M.D., *Superintendent*.  
 ARTHUR KANSERSTEIN, M.D., *Senior Physician*.  
 RICHARD METCALF, M.D., *Senior Physician*.  
 RICHARD C. COOKE, M.D., *Assistant Physician*.  
 LOUIS ALPERT, M.D., *Assistant Physician*.  
 JEAN L. LeBLANC, M.D., *Assistant Physician*.  
 CHIN S. CHANG, M.D., *Assistant Physician*.  
 EMANUEL KLINE, D.M.D., *Dentist*.  
 CAROLINE T. WHITE, R.N., *Superintendent of Nurses*.  
 MARY C. O'CONNELL, *Head Teacher*.  
 KATHERINE NUTE, *Head Occupational Therapist*.  
 SUSAN M. MURPHY, *Head Housekeeper*.  
 CHESTER TAYLOR, *Steward*.  
 ROBERT A. KENNEDY, *Chief Power Plant Engineer*.  
 THOMAS FRANCIS MAHONY, *Head Farmer*.

#### NON-RESIDENT OFFICERS

FLORENCE S. MONROE, *Treasurer*.  
 ZABDIEL B. ADAMS, M.D., *Orthopedic Consultant*.  
 LOUIS A. O. GODDU, M.D., *Orthopedic Consultant*.

### Report of the Superintendent

TO GEORGE H. BIGELOW, M.D., *Commissioner, Department of Public Health*:

I have the honor to submit the twenty-third annual report of the Lakeville State Sanatorium for the year ending November 30, 1932.

#### FINANCIAL STATEMENT

During the year there has been expended \$274,073.48 for maintenance, a gross weekly per capita cost of \$18.15. There has been collected from miscellaneous sources (the total of all collections) \$122,044.67. Deducting this amount from the gross maintenance expense leaves a net expense of \$152,028.81 and a net weekly per capita cost of \$10.07. There has been collected from private sources \$,4280.32,



from cities and towns \$116,098, from the State Board of Retirement \$117.32, from State Division of Child Guardianship as reimbursement for funeral expenses for a State ward \$35.00, and from sales \$1,514.03.

There were 22 patients supported wholly or in part by private funds, 330 by cities and towns, 78 wholly by the State, 5 State wards, and 44 patients on whom settlement has not been determined.

As authorized by Chapter 115, Acts of 1930 (\$6,800 for New Water Supply) expended prior to 1932, \$6,005.91, nothing during 1932, total, \$6,005.91. Reverting to State Treasury, \$794.09. As authorized by Chapter 146, Acts of 1929, and Chapter 115, Acts of 1930 (\$17,700 Fire Protection) expended prior to 1932, \$17,201.02, during 1932, \$489.04, total \$17,690.06. Reverting to State Treasury, \$9.94. As authorized by Chapter 115, Acts of 1930 (\$21,000 for Superintendent's House) expended prior to 1932, \$20,877.68, nothing during 1932, total, \$20,877.68. Reverting to State Treasury, \$122.32. As authorized by Chapter 115, Acts of 1930 (\$10,000 for furnishings and equipment on Children's Building) expended prior to 1932, \$9,919.97, nothing during 1932, total, \$9,919.97. Reverting to State Treasury, \$80.03. As authorized by Chapter 115, Acts of 1930 (\$13,000 for alterations on Administration Building) expended prior to 1932, \$11,753.72, during 1932, \$1,090.54, total, \$12,844.26. Reverting to State Treasury, \$155.74. As authorized by Chapter 1, Acts of 1931 (\$17,000 for alteration of two buildings) expended prior to 1932, \$14,721.81, during 1932, \$1,271.71, total, \$15,993.52. Not completed. As authorized by Chapter 1, Acts of 1931 (\$5,700 for repairs and improvements) expended prior to 1932, \$4,921.73, during 1932, \$679.70, total, \$5,601.43. Not completed.

#### POPULATION

There were 290 patients in the Sanatorium at the beginning of the year, December 1, 1931, and 285 patients at the close, November 30, 1932. The largest number present at any one time was 302, and the smallest 280. The daily average number of patients was 290.5, children 189.4, adults 101.1. There were 192 patients admitted during the year. For the classification of patients admitted, your attention is called to Table No. 6. The average age of patients admitted was 23 years. Including deaths there were 194 patients discharged and the average duration of residence was 506 days. Of those discharged 126 patients gained 2,194 pounds, an average gain of 17.4 pounds per person. Of those discharged there were 77 arrested, 3 apparently arrested, 28 quiescent, 31 improved, 16 unimproved, 19 deaths, 5 not considered (duration of treatment being less than one month), and 15 non-tuberculous. There were 106,302 hospital days of treatment, 5,001 more than last year. Average number of employees and officers during the year was 181.14.

#### MEDICAL REPORT

An analysis of the figures shows a very definite increase in the activities of the Medical Staff, there being thirty-nine more operations performed, two hundred and forty-six more casts applied, and seventy-eight more out-patients examined. Eleven post-mortem examinations were performed by the Pathological Department.

Sixteen per cent of the 192 patients admitted during the year, on routine examination, showed hilum or pulmonary lesions.

The general routine of treatment by rest, immobilization, sunlight, both general and artificial, and approved orthopedic procedures has been continued throughout the year. The increased number of arrested cases attests to the value of the continuation of these methods. The increase in the average gain in weight of the discharged patients who gained is rather remarkable, it being two pounds over the average gain for 1931.

A paper entitled "The Sanatorium Child" was written by the Superintendent and read by him as orator of the Plymouth District Medical Society on April 21, 1932. This paper was published in the New England Journal of Medicine under date of November 17, 1932.

The sanatorium has enjoyed the full approval of the American College of Surgeons during the year.

## INSTITUTIONAL ACTIVITIES

The farm has had another good year and certainly has justified its existence as reflected by the average gain of seventeen pounds per discharged patient who gained. The occupational therapy workshop, equipped with bench lathes, saws, drills and looms, has furnished many hours of diversion and instruction to a large group of patients both old and young.

## PERSONNEL CHANGES

Dr. George L. Parker resigned June 25, 1932, as assistant superintendent to accept a position on the staff at the Wrentham State School. Dr. Jean L. LeBlanc, a graduate of the University of Montreal, was appointed assistant physician July 11, 1932.

## IMPROVEMENTS AND CHANGES

The moving picture equipment has been brought up to date and now provides talking pictures in the wards.

Repair and replacement work this year has of necessity been limited for the most part to projects of an emergency nature.

An incinerator was installed the latter part of the year, filling a much needed and important function.

## RECOMMENDATIONS

I am again recommending lamp treatment rooms for the Men's and Women's Buildings so that the sicker patients in those buildings may have the benefit of this form of treatment during the inclement seasons.

The machinery furnishing refrigeration is now practically worn out and badly in need of replacements. New units should be installed.

The meat box is too small and additional space is required for the proper handling of the weekly supply of meat.

Electric lines from the Power House to the wards are of insufficient capacity to handle the load now required.

Work on the water shed at Clear Pond water supply has progressed to the point that several acres of land are now available for the planting of pines. This work should be continued.

## ACKNOWLEDGMENTS

To the many friends of the sanatorium who remembered the small patients at Christmas and other times during the year, I express the sincere thanks of every one. Such efforts and contributions are indeed appreciated.

The number of changes among the employees has been lower this past year than for many years. May I gratefully acknowledge the help of the faithful and loyal employees who have made the year's results possible.

To the various chaplains I express the appreciation of every one for the help and guidance they have contributed.

Our orthopedic consultant, Dr. Z. B. Adams, has been most helpful during the past, rather difficult year.

The social service workers have assisted in the satisfactory disposition of many of our discharged patients.

May I again express my appreciation for your continued confidence and guidance.

Respectfully submitted,

LEON A. ALLEY, M. D.

*Superintendent.*

## SURGICAL REPORT

*Operations*

The following operations were performed during the year:

Appendectomy . . . . .	4	Mastoid . . . . .	2
Arthrodesis:		Osteotomies:	
Tarsal bones . . . . .	1	Index finger . . . . .	1
Subastragaloid . . . . .	1	Radius . . . . .	1
Tibio-astragaloid . . . . .	4	External malleolus . . . . .	1
Cuneiform metatarsal articulation . . . . .	1	Lower end tibia . . . . .	1
Elbow . . . . .	2	Intertrochanteric . . . . .	1
Hip . . . . .	9	Perinephritic abscess . . . . .	1
Knee . . . . .	9	Rib resection . . . . .	1
Sacro-iliac . . . . .	4	Sequestrectomy . . . . .	3
Spine . . . . .	40	Synovectomy . . . . .	1
Cholecystotomy . . . . .	1	Tendon lengthening . . . . .	1
Colostomy . . . . .	1		
Dissection cyst . . . . .	1	Cystoscopy . . . . .	1
Exploration and dilatation sinuses . . . . .	1	Circumcision . . . . .	3
Exploratory laparotomy . . . . .	2	Tonsillectomy and adenoidectomy . . . . .	42
Laminectomy . . . . .	1		
Laminectomy with arthrodesis of spine . . . . .	1		143

*Casts*

Plaster casts for the year were as follows (types classified):

Anterior shells . . . . .	38	Impression of feet . . . . .	11
Posterior shells . . . . .	38	Jackets . . . . .	149
Boots . . . . .	38	Jacket with collar . . . . .	24
Cylinder to arm . . . . .	18	Jacket with helmet . . . . .	34
Cylinder to leg . . . . .	30	Jacket with straps . . . . .	72
Cylinder with boots . . . . .	22	Jacket with short spica . . . . .	92
Spica, short . . . . .	63	Jacket with short single spica . . . . .	15
Spica, long and short . . . . .	83	Jacket with long single spica . . . . .	92
Spica, long single . . . . .	43		
Spica, long double from hips to toes . . . . .	5		867

*Consultation Examinations*

	Positive	Suspicious	Negative	Re-exam.	Ex-Patients	Totals
Out-patients . . . . .	24	3	44	7	25	103
Employees . . . . .	1	—	56	—	—	57
	<u>25</u>	<u>3</u>	<u>100</u>	<u>7</u>	<u>25</u>	<u>160</u>

## LABORATORY REPORT

*Laboratory, X-Ray and Photographic Report*

<i>Clinical Microscopy</i>	Number
Hemoglobin determination . . . . .	588
Red blood cell counts . . . . .	588
White blood cell counts . . . . .	358
Differential counts . . . . .	358
Blood { Blood culture . . . . .	8
Blood grouping . . . . .	4
Coagulation time . . . . .	32
Bleeding time . . . . .	32
Chemical Analysis:	
Blood sugar . . . . .	6
Non-protein nitrogen . . . . .	34
Blood calcium . . . . .	5



P. D. 34.		159
	Occult blood . . . . .	136
	Guaiac test . . . . .	137
	Gastric contents . . . . .	24
	Van den Bergh test . . . . .	2
	Icterus . . . . .	1
Sputum:	{ Positive T. B. . . . .	18
	{ Negative T. B. . . . .	247
Urine Analysis . . . . .		4,213
Spinal fluid:	{ Positive T. B. . . . .	5
	{ Negative T. B. . . . .	6
Feces . . . . .		105
Pleural fluid . . . . .		7

*Bacteriological and Serological Tests:*

Nose and throat cultures	{ Clinical diphtheria . . . . .	-
	{ Diphtheria carriers . . . . .	2
	{ Negative K. L. . . . .	271
Purulent discharges examined for tubercle bacilli		2,016
Bacteriological cultures . . . . .		695
Isolation and cultivation of tubercle bacilli		597
Phenolsulphonphthalein tests . . . . .		94
Typhoid agglutination tests (Widal) . . . . .		39
Typhoid test (feces and urine) . . . . .		77
Wassermann tests	{ Positive . . . . .	11
	{ Negative . . . . .	212
	{ Doubtful . . . . .	13
Kahn tests	{ Positive . . . . .	4
	{ Negative . . . . .	17
Hinton tests	{ Positive . . . . .	2
	{ Negative . . . . .	12
Von Pirquet tests	{ Positive. . . . .	172
	{ Negative . . . . .	17
Mantoux tests	{ Positive . . . . .	2
	{ Negative . . . . .	24

*Animal Experimentation:*

Inoculations	Guinea pig . . . . .	196
Autopsies	Positive T. B. . . . .	59
	Negative T. B. . . . .	122

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11,568

*Pathology:*

Surgical cases . . . . .	40
Biopsy . . . . .	4
Post-mortem cases . . . . .	11
Tissue secting (celloidin) . . . . .	146

*Preparation of Media (each month):*

Glycerine bouillon . . . . .	10
Glycerine agar potato . . . . .	4
Blood agar plate . . . . .	3
Petroff's medium . . . . .	11
Loeffler's blood medium . . . . .	12
Eosin methylene blue agar . . . . .	3

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Total . . . . . 11,812

*Pathological Diagnosis:*

Histological tuberculosis . . . . .	19
Chronic inflammation . . . . .	13
Syphilis . . . . .	1

*Proven Tuberculosis:*

## Diagnosis (by guinea pig)

Tuberculous abdomen . . . . .	7
Tuberculous ankle . . . . .	3
Tuberculous cervix . . . . .	1
Tuberculous chest sinus . . . . .	1
Tuberculous gland . . . . .	7
Tuberculous groin . . . . .	2
Tuberculous hip . . . . .	10
Tuberculous intestine . . . . .	4
Tuberculous kidney . . . . .	19
Tuberculous knee . . . . .	2
Tuberculous meningitis . . . . .	2
Tuberculous pubis . . . . .	1
Tuberculous ribs . . . . .	1
Tuberculous sacro-iliac . . . . .	1
Tuberculous shoulder . . . . .	1
Tuberculous spine . . . . .	3
Tuberculous thigh . . . . .	1
Pulmonary tuberculosis . . . . .	1
Total . . . . .	100

*X-Rays*

Number of X-rays taken from December 1, 1931 to November 30, 1932 . . . . . 2,072

*Photographs*

Number of photographs taken from December 1, 1931 to November 30, 1932 . . . . . 553

## DENTAL REPORT

*From December 1, 1931 to November 30, 1932*

Examinations . . . . .	648	Radiographs . . . . .	156
Prophylactic treatments . . . . .	367	Irrigations . . . . .	192
Fillings:		Vincent's infection treatments . . . . .	42
Permanent teeth . . . . .	764	Root canal treatments . . . . .	18
Temporary teeth . . . . .	149	Pulpectomies . . . . .	3
Extractions:		Apicoectomy . . . . .	1
Permanent teeth . . . . .	208	General anesthesia:	
Temporary teeth . . . . .	211	Ether . . . . .	6
Treatments . . . . .	734	Nitrous oxide . . . . .	1
Restorations:		Ethyl chloride . . . . .	8
Dentures:		Local anesthesia:	
Full . . . . .	6	Novocaine . . . . .	167
Partial . . . . .	2	Ethyl chloride . . . . .	113
Repair . . . . .	2	Topical . . . . .	51
Bridges:		Oral surgical operations . . . . .	15
Removable . . . . .	1		
Repair . . . . .	4	Total operations . . . . .	3,871
Visits . . . . .			
New patients . . . . .			1,906
Dismissals . . . . .			218
			342

Although a great many Vincent's infection treatments were administered, only two patients in the hospital received treatment. The other four cases were employees, and of the total number of treatments administered one employee alone, whose case involved the entire gingivæ and extended into the throat, involving both tonsils, received twelve treatments. Of the two hospital cases, one patient had the infection on admission.

Considerable time was given to the four surveys, at intervals of three months,

for the experiment on diet and nutrition in relation to dental caries. Four complete examinations and chartings were recorded.

While the children here have shown good calcification and improvement in diseased bones and carious teeth, if a change of diet will hasten these processes, the value cannot be estimated. It is too early to report any conclusions at this time, but the changes to date have been encouraging. A complete report should be possible during the coming year.

Observation of the records of the admitted cases for the past year discloses the following facts:

1. That in spite of the many dental health programs which are being carried on in every community the majority of the mouths show a rampant neglect of the oral cavity.

2. That the majority of children under six years of age have never been to a dentist.

3. That the large number of cases presenting a characteristic gingivitis, which in the majority of cases clears up without treatment after a few months of hospitalization, tends to substantiate a previous statement, that a deficient diet is the etiological factor, the lack of vitamins C and D being the usual deficiency.

SCHOOL REPORT

The activities of the Educational Department have been continued and enlarged to include many correspondence courses in conjunction with the State Department of Education. The joint services of the Departments of Education and Occupational Therapy have assisted the patients in carrying out many worthwhile courses. A Red Cross course in Home Hygiene consisting of twenty-five lectures and demonstrations was completed during the year and a class of twelve was graduated the evening of October 11, 1932.

Statistical Tables

TABLE 1.—Admissions and Discharges

	ADULTS		CHILDREN		Totals
	Males	Females	Males	Females	
Patients in the Sanatorium Nov. 30, 1931	49	52	112	74	287
Patients admitted Dec. 1, 1931, to Nov. 30, 1932	42	62	46	42	192
Patients discharged Dec. 1, 1931, to Nov. 30, 1932	45	62	42	45	194
Patients remaining in the Sanatorium Nov. 30, 1932	48	53	114	70	285
Daily average number of patients	49.2	51.9	118.4	71.0	290.5
Deaths (included in number discharged)	5	3	4	7	19

TABLE 2.—Civil Condition of Patients Admitted

Single	21	23	46	42	132
Married	19	24	—	—	43
Widowed	1	5	—	—	6
Divorced	1	4	—	—	5
Separated	—	6	—	—	6
Total	42	62	46	42	192

TABLE 3.—Age of Patients Admitted

Under 5 years	—	—	13	8	21
5 to 9 "	—	—	13	9	22
10 to 14 "	—	—	11	16	27
15 to 19 "	—	—	5	7	12
20 to 29 "	19	28	4	2	53
30 to 39 "	11	15	—	—	26
40 to 49 "	6	9	—	—	15
50 to 59 "	4	8	—	—	12
60 to 69 "	1	1	—	—	2
70 and over	1	1	—	—	2
Average Age	35.35	35.54	9.85	11.66	24.13
Total	42	62	46	42	192



TABLE 4.—*Nativity and Parentage of Patients Admitted*

PLACE OF NATIVITY	ADULTS						CHILDREN						TOTALS		
	MALES			FEMALES			MALES			FEMALES					
	Patient	Father	Mother	Patient	Father	Mother	Patient	Father	Mother	Patient	Father	Mother	Patient	Father	Mother
United States:															
Massachusetts	14	6	5	29	12	12	43	15	17	37	12	14	123	45	48
Other New England States	4	5	4	5	3	9	1	1	4	2	3	3	12	12	20
Other States	5	2	2	2	3	1	1	4	1	—	3	—	8	12	4
Total	23	13	11	36	18	22	45	20	22	39	18	17	143	69	72
Other Countries:															
Armenia	1	1	1	1	1	1	—	1	1	—	—	—	2	3	3
Belgium	—	—	—	1	1	1	—	—	—	—	—	—	1	1	1
Canada	5	6	8	11	15	13	—	7	6	2	4	6	18	32	33
China	—	1	1	—	—	—	—	—	—	—	—	—	—	1	1
Denmark	—	1	1	—	—	—	—	—	—	—	—	—	—	1	1
England	1	1	2	2	3	2	—	1	—	1	2	—	3	5	7
Finland	—	—	—	—	—	—	—	1	1	—	—	—	—	1	1
Germany	—	—	—	—	1	2	—	—	—	—	—	—	—	1	2
Greece	4	4	4	3	3	3	—	—	—	2	2	—	7	9	9
Ireland	1	5	4	3	6	4	—	1	1	—	1	3	4	13	12
Italy	3	4	4	—	2	1	—	3	3	—	5	4	3	14	12
Lithuania	—	—	—	—	—	—	—	4	2	—	—	—	—	4	2
Newfoundland	—	—	—	2	3	3	—	1	2	1	1	1	3	5	6
Norway	—	—	—	—	1	—	—	—	—	—	—	—	—	1	—
Poland	—	—	—	1	1	1	—	1	2	—	2	2	1	4	5
Portugal	1	1	1	2	2	2	—	2	2	—	4	1	3	9	6
Russia	1	1	1	—	2	2	1	4	3	—	1	3	2	8	9
Spain	—	—	—	—	—	—	—	—	—	—	1	1	—	1	1
Sweden	1	1	1	—	1	1	—	—	—	—	—	—	1	2	2
Unknown	1	3	3	—	2	4	—	1	—	—	2	—	1	8	7
Totals	42	42	42	62	62	62	46	46	46	42	42	42	192	192	192

TABLE 5.—*Residence of Patients Admitted*

	Adults	Children	Totals		Adults	Children	Total
Amesbury	—	1	1	Methuen	—	1	1
Barnstable	1	—	1	Middleborough	—	2	2
Belmont	1	—	1	New Bedford	2	3	5
Berlin	—	1	1	Newburyport	1	1	2
Boston	36	22	58	Newton	1	1	2
Bridgewater	—	1	1	North Andover	1	1	2
Brockton	1	1	2	No. Attleborough	—	1	1
Brookline	—	1	1	Northampton	—	1	1
Cambridge	5	1	6	Peabody	2	2	4
Chelsea	1	2	3	Pittsfield	1	—	1
Chicopee	1	—	1	Quincy	1	1	2
Dover	1	—	1	Randolph	—	1	1
Everett	2	1	3	Raynham	1	—	1
Fairhaven	—	1	1	Reading	1	—	1
Fall River	—	1	1	Revere	1	1	2
Falmouth	1	1	2	Rockland	1	—	1
Fitchburg	1	—	1	Sharon	—	1	1
Foxboro	—	1	1	Somerville	2	3	5
Gardner	1	—	1	Springfield	3	1	4
Gloucester	1	—	1	State Farm	1	—	1
Grafton	1	—	1	Stoneham	1	—	1
Harwich	—	1	1	Stoughton	1	—	1
Haverhill	3	1	4	Sutton	—	1	1
Hingham	—	1	1	Taunton	—	4	4
Holbrook	1	—	1	Topsfield	—	1	1
Holyoke	1	—	1	Wakefield	1	—	1
Hudson	1	—	1	Waltham	2	2	4
Lakeville	2	—	2	Wareham	—	1	1
Lawrence	3	3	6	Wenham	—	1	1
Leominster	2	—	2	Weymouth	1	1	2
Lowell	1	3	4	Wilmington	—	1	1
Lynn	3	4	7	Winthrop	1	—	1
Malden	5	2	7	Woburn	—	1	1
Marblehead	—	1	1				
Medford	1	3	4				
Melrose	1	—	1	Total	104	88	192

TABLE 6.—*Stage of Disease on Admission*

	ADULTS		CHILDREN		Totals	Per- centages
	Males	Females	Males	Females		
<i>One Lesion</i>						
Tb. adenitis cervical . . . . .	-	5	6	3	14	7.29
Tb. adenitis inguinal . . . . .	-	-	-	1	1	.52
Tb. adenitis mesenteric . . . . .	-	1	2	2	5	2.60
Tb. ankle . . . . .	-	1	2	-	3	1.56
Tb. bursa, sub-gluteal . . . . .	1	-	-	-	1	.52
Tb. cecum . . . . .	2	-	-	-	2	1.04
Tb. colitis . . . . .	-	1	-	-	1	.52
Tb. elbow . . . . .	-	1	-	-	1	.52
Tb. foot . . . . .	2	-	-	-	2	1.04
Tb. hip . . . . .	3	2	3	1	9	4.69
Tb. knee . . . . .	1	-	1	1	3	1.56
Tb. ilium . . . . .	-	1	-	-	1	.52
Lupus vulgaris . . . . .	-	-	-	1	1	.52
Tb. nephritis . . . . .	1	3	-	-	4	2.08
Tb. ophthalmia . . . . .	1	2	4	1	8	4.17
Tb. peritonitis . . . . .	1	9	3	4	17	8.85
Tb. pubic bone . . . . .	1	-	-	-	1	.52
Tb. ribs . . . . .	-	1	-	-	1	.52
Tb. sacro-iliac . . . . .	-	-	1	-	1	.52
Tb. spine . . . . .	7	7	6	4	24	12.50
Tb. sternum . . . . .	1	-	-	-	1	.52
Tb. uterus . . . . .	-	1	-	-	1	.52
Tb. uveitis . . . . .	-	1	-	-	1	.52
	21	36	28	18	103	-
<i>One Lesion with Hilum Tuberculosis</i>						
Tb. adenitis cervical, hilum Tb. Tb. active . . . . .	-	-	-	3	3	1.56
Tb. adenitis mesenteric, hilum active . . . . .	-	-	-	1	1	.52
Tb. hip, hilum Tb. active . . . . .	-	-	1	1	2	1.04
Tb. ophthalmia, hilum Tb. active . . . . .	-	-	-	2	2	1.04
Tb. peritonitis, hilum Tb. active . . . . .	-	-	-	1	1	.52
Tb. spine, hilum Tb. active . . . . .	-	-	1	1	2	1.04
Tb. ankle, hilum Tb. inactive . . . . .	-	-	1	-	1	.52
Lupus vulgaris, hilum Tb. in- active . . . . .	-	-	-	1	1	.52
	-	-	3	10	13	-
<i>One Lesion with Pulmonary Tuberculosis</i>						
Tb. peritonitis, pul. Tb. active . . . . .	1	-	-	-	1	.52
Tb. adenitis cer., pul. Tb. in- active . . . . .	1	-	-	-	1	.52
Tb. knee, pul. Tb. inactive . . . . .	-	1	-	-	1	.52
Tb. nephritis, pul. Tb. inactive . . . . .	-	1	-	-	1	.52
Tb. peritonitis, pul. Tb. inactive . . . . .	-	1	-	-	1	.52
Tb. spine, pul. Tb. inactive . . . . .	3	1	-	-	4	2.08
	5	4	-	-	9	-
<i>Two Lesions</i>						
Tb. adenitis, cervical and axillary . . . . .	1	-	-	-	1	.52
Tb. adenitis, cervical, Tb. oph- thalmia . . . . .	-	-	-	1	1	.52
Tb. adenitis, cervical, Tb. spine . . . . .	1	-	-	-	1	.52
Tb. adenitis, mesenteric, Tb. peritonitis . . . . .	-	-	1	-	1	.52
Tb. psoas abscess, Tb. spine . . . . .	-	1	-	-	1	.52
Tb. ankle, Tb. knee . . . . .	-	-	-	1	1	.52
Tb. elbow, Tb. hip . . . . .	-	1	-	-	1	.52
Tb. epididymitis, Tb. G. U. tract . . . . .	1	-	-	-	1	.52
Tb. hip, bilateral . . . . .	-	-	-	1	1	.52
Tb. knee, Tb. hip . . . . .	-	2	-	-	2	1.04
Tb. metatarsal, Tb. fibular . . . . .	-	-	1	-	1	.52
Tb. nephritis, Tb. cystitis . . . . .	-	1	-	-	1	.52
Tb. nephritis, Tb. epididymitis . . . . .	1	-	-	-	1	.52
Tb. ophthalmia, bilateral . . . . .	-	-	-	2	2	1.04
Tb. ophthalmia, Tb. adenitis cervical . . . . .	-	1	-	-	1	.52
Tb. otitis-media, Tb. adenitis cervical . . . . .	-	-	1	-	1	.52
Tb. peritonitis, Tb. adenitis cervical . . . . .	-	-	-	1	1	.52
Tb. peritonitis, Tb. endome- tritis . . . . .	-	2	-	-	2	1.04
Tb. peritonitis, Tb. ophthalmia . . . . .	-	1	1	-	2	1.04

TABLE 6.—*Stage of Disease on Admission—(Concluded)*

	ADULTS		CHILDREN		Totals	Per-centage
	Males	Females	Males	Females		
Tb. peritonitis, Tb. pleuritis . . .	-	-	-	1	1	.52
Tb. peritonitis, Tb. spine . . .	-	1	-	-	1	.52
Tb. sacro-iliac, bilateral . . .	1	-	-	-	1	.52
Tb. shoulder, Tb. adenitis cer. . .	1	-	-	-	1	.52
Tb. spine, Tb. adenitis cer. . .	-	-	1	-	1	.52
Tb. spine, Tb. hip . . .	1	-	-	-	1	.52
Tb. spine, Tb. nephritis . . .	1	2	-	-	3	1.56
Tb. spine, Tb. peritonitis . . .	-	1	-	-	1	.52
<i>Two Lesions with Hilum Tuberculosis</i>	8	13	5	7	33	-
Tb. adenitis mesenteric, Tb. colitis, hilum Tb. active . . .	-	-	1	-	1	.52
Tb. knee, Tb. tarsus, hilum Tb. active . . .	-	-	1	-	1	.52
<i>Two Lesions with Pulmonary Tuberculosis</i>	-	-	2	-	2	-
Tb. nephritis, Tb. cystitis, pul. Tb. active . . .	1	-	-	-	1	.52
Tb. spine, Tb. sacro-iliac, pul. Tb. active . . .	-	1	-	-	1	.52
Tb. adenitis cervical and axillary, pul. Tb. inactive . . .	1	-	-	-	1	.52
Tb. colitis, Tb. adenitis, mesenteric, pul. Tb. inactive . . .	-	1	-	-	1	.52
Tb. spine, Tb. nephritis, pul. Tb. inactive . . .	1	-	-	-	1	.52
<i>Three Lesions</i>	3	2	-	-	5	-
Tb. adenitis cervical, mesenteric, and inguinal . . .	-	-	1	-	1	.52
Tb. nephritis, Tb. epididymitis, bilateral . . .	1	-	1	-	2	1.04
Tb. ophthalmia, bilateral, Tb. adenitis cervical . . .	-	-	-	1	1	.52
Tb. spine, Tb. foot, Tb. elbow . . .	-	-	-	1	1	.52
<i>Three Lesions with Pulmonary Tuberculosis</i>	1	-	2	2	5	-
Tb. hip, Tb. adenitis cervical and mesenteric, pul. Tb. inactive . . .	-	1	-	-	1	.52
<i>Four Lesions</i>	-	-	1	-	1	.52
Tb. spine, Tb. adenitis axillary, cervical and inguinal . . .	-	-	-	-	-	-
<i>Four Lesions with Pulmonary Tuberculosis</i>	-	-	-	-	-	-
Tb. hip, Tb. nephritis, Tb. epididymitis, bilateral, pul. Tb. inactive . . .	1	-	-	-	1	.52
<i>Non-tuberculous</i>	-	-	-	1	1	.52
Abdominal disease . . .	-	-	-	-	-	-
Abscess of neck . . .	-	-	1	-	1	.52
Arthritis (lues) . . .	-	-	-	1	1	.52
Primary anemia, broncho pneumonia . . .	-	1	-	-	1	.52
Cellulitis . . .	-	-	-	1	1	.52
Choroiditis . . .	-	-	1	-	1	.52
Furunculosis . . .	-	-	-	1	1	.52
Hip . . .	-	-	1	-	1	.52
Osteomyelitis pubic bone . . .	-	-	1	-	1	.52
Phlyctenular keratitis . . .	-	-	-	1	1	.52
Prostate . . .	1	-	-	-	1	.52
Sacro-iliac . . .	1	-	-	-	1	.52
Scoliosis of spine . . .	-	1	-	-	1	.52
Syphilis . . .	1	-	-	-	1	.52
Varicose Ulcers . . .	-	1	-	-	1	.52
Chronic ulceration of leg . . .	-	1	-	-	1	.52
Unclassified . . .	-	2	1	-	3	1.56
	3	6	5	5	19	



TABLE 7.—*Condition on Discharge*

	ADULTS		CHILDREN		Totals	Per-centage
	Males	Females	Males	Females		
Arrested . . . . .	14	19	24	20	77	39.69
Apparently arrested . . . . .	1	1	1	—	3	1.55
Quiescent . . . . .	6	11	5	6	28	14.43
Improved . . . . .	9	16	2	4	31	15.98
Unimproved . . . . .	7	5	2	2	16	8.25
Deaths . . . . .	5	3	4	7	19	9.79
Not considered . . . . .	2	2	1	—	5	2.58
Non-tuberculous . . . . .	1	5	3	6	15	7.73
	45	62	42	45	194	—

TABLE 8.—*Deaths*

DURATION OF DISEASE	ADULTS		CHILDREN		Totals	LENGTH OF RESIDENCE IN SANATORIUM				
	Males	Fe-males	Males	Fe-males		ADULTS		CHILDREN		Total
						Males	Fe-males	Males	Fe-males	
Less than 1 month	—	—	—	—	—	—	—	—	1	1
1 to 2 months	—	—	—	—	—	—	—	—	—	—
2 to 3 "	—	—	—	—	—	1	1	1	2	5
3 to 4 "	—	—	—	1	1	—	—	—	—	—
4 to 5 "	—	—	—	—	—	—	1	—	—	1
5 to 6 "	—	—	—	—	—	—	—	—	—	—
6 to 7 "	—	—	—	—	—	—	—	—	—	—
7 to 8 "	—	—	—	—	—	1	—	—	—	1
8 to 9 "	—	—	—	—	—	1	—	—	—	1
9 to 10 "	—	—	—	—	—	—	—	—	1	1
10 to 12 "	—	1	—	1	2	—	1	—	1	2
12 to 18 "	2	—	1	—	3	—	—	1	1	2
18 to 24 "	—	—	—	1	1	1	—	—	—	1
Over 2 years	3	2	3	4	12	1	—	2	1	4
	5	3	4	7	19	5	3	4	7	19

TABLE 9.—*Causes of Death*

	ADULTS		CHILDREN		Totals
	Males	Females	Males	Females	
Tb. adenitis, cervical, Tb. chronic mastoiditis	—	—	—	1	1
Tb. hip, amyloid disease, acute pericarditis, chronic myocarditis	—	—	1	—	1
Tb. hip, Tb. spine, amyloidosis	—	—	—	1	1
Tb. hip, syphilis	—	—	1	—	1
Tb. hip, Tb. spine, Tb. sacro-iliac	1	—	—	—	1
Tb. knee, chronic Tb. spondylitis with multiple sinuses	—	—	—	1	1
Tb. nephritis, septicemia	—	1	—	—	1
Tb. peritonitis, amyloid disease	—	—	—	1	1
Tb. peritonitis, hilum Tb., Tb. meningitis	—	—	—	1	1
Tb. peritonitis, Tb. pleuritis	—	—	—	1	1
Tb. sacro-iliac	1	—	—	—	1
Tb. sacro-iliac, Tb. meningitis	1	—	—	—	1
Tb. spine	—	—	1	—	1
Tb. spine, Tb. elbow, pulmonary Tb.	—	1	—	—	1
Tb. spine, pulmonary Tb.	2	—	—	—	2
Tb. spine, Tb. sacro-iliac, pulmonary Tb., amyloid disease, pericarditis, peritonitis	—	1	—	—	1
Tb. spine, septicemia	—	—	—	1	1
Tb. spine, Tb. lower end of tibia and fibular, Tb. meningitis	—	—	1	—	1
	5	3	4	7	19

## Financial Report, Lakeville State Sanatorium

To the Department of Public Health:

I respectfully submit the following report of the finances of this institution for the fiscal year ending November 30, 1932.

## STATEMENT OF EARNINGS

Board of patients:									
Private	.	.	.	.	.	.	.	\$4,186	00
Cities and Towns	.	.	.	.	.	.	.	121,731	58
Reimbursement	.	.	.	.	.	.	.	35	00
								<u>\$125,952</u>	58
Personal services:									
Reimbursement from Board of Retirement	.	.	.	.	.	.	.	\$117	32
Sales:									
Food	.	.	.	.	.	.	.	\$63	37
Furnishings and household supplies	.	.	.	.	.	.	.	3	50
Medical and general care	.	.	.	.	.	.	.	70	00
Farm	.	.	.	.	.	.	.	1,022	20
Garage, stable and grounds	.	.	.	.	.	.	.	121	50
Repairs, ordinary	.	.	.	.	.	.	.	96	70
Arts and crafts sales	.	.	.	.	.	.	.	11	33
								<u>\$1,388</u>	60
Total Sales	.	.	.	.	.	.	.		
Miscellaneous:									
Interest on bank balances	.	.	.	.	.	.	.	\$115	08
								<u>\$115</u>	08
Total, miscellaneous	.	.	.	.	.	.	.		
Total earnings for the year	.	.	.	.	.	.	.		\$127,573 58
Total cash receipts reverting and transferred to the State Treasurer	.	.	.	.	.	.	.		\$122,044 67
Accounts Receivable outstanding Dec. 1, 1931	.	.	.	.	.	.	.	\$27,229	32
Accounts Receivable outstanding Nov. 30, 1932	.	.	.	.	.	.	.	32,758	23
								<u>\$5,528</u>	91
Accounts Receivable increased	.	.	.	.	.	.	.		

## MAINTENANCE APPROPRIATION

Balance from previous year, brought forward	.	.	.	.	.	.	.		\$3,892 02
Appropriation, current year	.	.	.	.	.	.	.	\$277,550	00
								<u>\$281,442</u>	02
Total	.	.	.	.	.	.	.		
Expenditures as follows:									
Personal services	.	.	.	.	.	.	.	\$171,521	62
Food	.	.	.	.	.	.	.	31,334	65
Medical and general care	.	.	.	.	.	.	.	11,033	82
Farm	.	.	.	.	.	.	.	14,485	08
Heat, light and power	.	.	.	.	.	.	.	11,817	74
Garage, stable and grounds	.	.	.	.	.	.	.	1,191	27
Travel, transportation and office expenses	.	.	.	.	.	.	.	3,409	49
Religious instruction	.	.	.	.	.	.	.	1,380	00
Clothing and materials	.	.	.	.	.	.	.	682	15
Furnishings and household supplies	.	.	.	.	.	.	.	15,044	74
Repairs, ordinary	.	.	.	.	.	.	.	3,926	02
Repairs and renewals	.	.	.	.	.	.	.	6,947	57
Grounds	.	.	.	.	.	.	.	1,299	33
								<u>\$274,073</u>	48
Total Maintenance Expenditures	.	.	.	.	.	.	.		
Balance of Maintenance Appropriation, Nov. 30, 1932	.	.	.	.	.	.	.	\$7,368	54
Estimated Outstanding Liabilities, Nov. 30, 1932	.	.	.	.	.	.	.	\$3,137	61

## SPECIAL APPROPRIATIONS

Balance December 1, 1932, brought forward	.	.	.	.	.	.	.		\$5,798 16
Appropriations for current year	.	.	.	.	.	.	.		00,000 00
								<u>\$5,798</u>	16
Total	.	.	.	.	.	.	.		
Expended during the year (see statement below)	.	.	.	.	.	.	.	\$3,530	99
Reverting to Treasury of Commonwealth	.	.	.	.	.	.	.	* 1,162	12
(Star balances below that are reverting)	.	.	.	.	.	.	.		4,693 11
Balance November 30, 1932, carried to next year	.	.	.	.	.	.	.		\$1,105 05

APPROPRIATION	Act or Resolve	Total Amount Appropriated	Expended during Fiscal Year	Total Expended to Date	Balance at End of Year
New water supply	1930-115	\$6,800 00	-	\$6,005 91	\$794 09*
Addition to fire protection	1929-146	8,700 00			
	1930-115	9,000 00	\$489 04	17,690 06	9 94*
Superintendent's home	1930-115	21,000 00	-	20,877 68	122 32*
Alteration on Administration Building	1930-115	13,000 00	1,090 54	12,844 26	155 74*
Furnishings and equipment on Children's Building	1930-115	10,000 00	-	9,919 97	80 03*
Alteration on two buildings	1931-1	17,000 00	1,271 71	15,993 52	1,006 48
Repairs and improvements	1931-1	5,700 00	679 70	5,601 43	98 57
		<u>\$91,200 00</u>	<u>\$3,530 99</u>	<u>\$88,932 83</u>	<u>\$2,267 17</u>
Reverting*					1,162 12
Carried forward to 1933					\$1,105 05

PER CAPITA

During the year the average number of patients has been . . . . .		290.4425
Total cost of maintenance . . . . .	\$274,073.48	
Equal to a weekly per capita cost of (52 weeks to year) . . . . .	18.15	
Total receipts for the year . . . . .	122,044.67	
Equal to a weekly per capita of . . . . .	8.08	
Total net cost of maintenance for year . . . . .	{ \$274,073.48 122,044.67	
Total maintenance less total receipts . . . . .		\$152,028.81
Net weekly per capita . . . . .	\$10.07	

Respectfully submitted,

FLORENCE S. MONROE,  
*Treasurer.*

Inventory, Lakeville State Sanatorium  
GRAND SUMMARY SHEET  
November 30, 1932

REAL ESTATE

Land, 251.61 acres . . . . .	\$70,578 51	
Buildings . . . . .	710,172 66	
Betterments (additions and improvements) . . . . .	4,145 79	
Total, Real Estate . . . . .		\$784,896 96

PERSONAL PROPERTY UNDISTRIBUTED SUPPLIES

Travel, transportation and office expenses . . . . .	\$360 91	
Food . . . . .	4,683 29	
Clothing and materials . . . . .	66 54	
Furnishings and household supplies . . . . .	1,738 26	
Medical and general care . . . . .	1,950 50	
Heat, light and power . . . . .	2,154 57	
Farm . . . . .	1,261 92	
Garage, stable and grounds . . . . .	129 75	
Repairs . . . . .	1,489 92	
Total . . . . .		\$13,835 66

PERSONAL PROPERTY DISTRIBUTED SUPPLIES

Travel, transportation and office expenses . . . . .	\$2,351 78	
Clothing and materials . . . . .	636 08	
Furnishings and household supplies . . . . .	47,018 84	
Medical and general care . . . . .	16,209 47	
Heat, light and power . . . . .	95 25	
Farm . . . . .	27,876 93	
Garage, stable and grounds . . . . .	2,742 71	
Repairs . . . . .	2,082 34	
Total . . . . .		\$99,013 40

GRAND SUMMARY

Real Estate, Total . . . . .	\$784,896 96	
Personal Property—Undistributed Supplies, Total . . . . .	13,835 66	
Personal Property—Distributed Supplies, Total . . . . .	99,013 40	
Grand Total . . . . .		\$897,745 92



## NORTH READING STATE SANATORIUM

## RESIDENT OFFICERS

CARL C. MACCORISON, M.D., *Sanatorium Superintendent.*  
 EARLE C. WILLOUGHBY, M.D., *Assistant Superintendent.*  
 GERALD H. CARON, M.D., *Assistant Physician.*  
 ANNA H. MAXWELL, M.D., *Assistant Physician.*  
 JAMES H. POWERS, D.M.D., *Dentist.*  
 ETHEL M. KNIGHT, *Treasurer.*

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ELLEN MURRAY, R.N., *Principal of School of Nursing.*  
 ELIZABETH HASLETT, *Head Housekeeper.*  
 BEULAH F. PHILBROOK, *Head School Teacher.*  
 J. ELLIS DOUCETTE, *Sanatorium Steward.*  
 DANIEL J. SCOTT, *Chief Power Plant Engineer.*  
 EDWARD J. LEARY, *Head Farmer.*

## NON-RESIDENT OFFICERS

EDWARD D. CHURCHILL, M.D., *Consultant, Chest Surgeon.*  
 ZABDIEL ADAMS, M.D., *Consultant, Orthopedist.*  
 HALSEY B. LODER, M.D., *Consultant, General Surgeon.*  
 HAROLD L. HIGGINS, M.D., *Consultant, Pediatrics.*  
 THOMAS ODONEAL, M.D., *Consultant, Eye and Ear.*  
 CHARLES W. DEWOLFE, M.D., *Consultant, Nose and Throat.*

## Report of the Superintendent

To GEORGE H. BIGELOW, M.D., *Commissioner, Department of Public Health:*

I have the honor of submitting the twenty-second annual report of the North Reading State Sanatorium for the year ending November 30, 1932.

## FINANCIAL STATEMENT

During the year there has been expended for maintenance \$228,914.97, a gross weekly per capita cost of \$16.215. There has been expended from Special Appropriations authorized by Chapters 115 and 245, Acts of 1930-1931, for "Improving Water Supply and Fire Protection", the sum of \$1,857.16; Chapters 115 and 170, Acts of 1930-1932, for "Employees' Building", the sum of \$3,534.68; Chapter 69, Acts of 1932, for "Certain Filter Beds", the sum of \$15,835.09; Chapter 146, Acts of 1932, for "Admitting and Isolation Building", the sum of \$2,776.07; Chapter 115, Acts of 1930, for "Addition to Nurses' Hall", the sum of \$117.88.

There has been collected from miscellaneous sources \$77,443.22 (the total of all collections). Deducting this amount from the gross maintenance expenses leaves a net expense of \$151,471.75. The net weekly per capita cost was \$10.73. There has been collected from private funds \$4,930.29; from cities and towns \$78,295. Thirty cases (including 16 from the Division of Child Guardianship) were supported by private funds; 345 by cities and towns and 78 wholly by the State.

## POPULATION

There were 274 patients at the beginning of the fiscal year, and 281 at the close. The largest number present at any one time was 284 and the smallest number present at any one time was 258. The daily average number of patients was 271.40 as against 262.81 last year. There were 271 patients admitted during the year, nine less than last year.

There were 213 cases admitted from cities and towns of over 25,000 population, and 58 cases from cities and towns under 25,000 population. The average age of patients was 8.84 years, a little below last year. Including deaths, there were 264 cases discharged, and the average duration of residence was 10 months and 17 days. Of those discharged, 227 gained 2,463 $\frac{3}{4}$  lbs., an average gain of 9.37 lbs. per person.

Of the discharges, there were 37 apparently well, 70 arrested, 76 apparently arrested, 15 quiescent, 24 improved, 16 unimproved, 13 not considered, the du-

ration of treatment being less than thirty days. There were 13 deaths, two more than last year.

There were 99,337 hospital days.

Average number of employees and officers during the year: Males 54.72. Females 75.47. Total 130.19.

#### MEDICAL REPORT

During the past year we have been employing pneumothorax more and more in the treatment of adult type tuberculosis. Fifteen children received pneumothorax and 186 refills were administered. Twelve of the refills were given to a discharged Rutland patient and two Rutland student nurses. Phrenic exorexis was performed on two patients at the Massachusetts General Hospital and one pneumolysis. Two patients were discharged to the Massachusetts General Hospital for treatment for bronchiectasis and one to the Boston City Hospital.

Seven eye, ear, nose and throat clinics were held during the year by our consultants, Doctors Odoneal and DeWolfe. One hundred and one children were referred to these clinics, 44 were fitted to glasses, and tonsils and adenoids were removed from 11 patients. Two mastoid operations were performed.

The value of the Admitting and Isolation Building has again been demonstrated by the successful control of the contagious diseases that have appeared from time to time. Chicken pox developed in the babies' ward on March 25th. From this date until August 2nd, we had forty cases. The infection was probably brought in to the Sanatorium by the mother of the first child showing evidence of the disease.

On April 29 and May 10 two little girls on Pavilion B West developed scarlet fever. These cases were immediately isolated in the hospital and the pavilion quarantined for a period of ten days. No further cases developed.

On October 21 a small boy on Pavilion B East came down with German measles but no other patient contracted the disease.

During the past year the percentage of children in the age group under six years of age has increased from 22.86 per cent in 1931 to 32.10 per cent in 1932.

We find it rather difficult at present to care for this increased number of children inasmuch as we have only 46 beds for children under the age of six.

We also note a slight increase in the percentage of admission of patients having pulmonary type tuberculosis. It is also interesting to note that there has been a decrease in the number of moderately advanced and advanced cases admitted and a rather marked increase in the number of minimal cases.

Our consultation clinics and out-patient work show an increase over the previous year. The Lawrence clinic has shown a falling off in attendance but there has been a marked increase in attendance at the Haverhill clinic:

	Positive	Negative	Suspicious	Total
Consultation clinic . . . . .	23	4	150	177
Out-patient clinic . . . . .	155	17	630	802
X-rays: Consultation clinic 136 }				
Out-patient 910 }				1,046

Dr. Cooper of the Department of Mental Diseases and her associates held eight clinics at the Sanatorium. Nineteen children attended these clinics, all of whom were of school age.

The work of Dr. Cooper has been of great assistance to us in solving many of our problem cases, and her many suggestions relative to the conduct of our extra-curricula course have been most helpful.

#### INSTITUTIONAL ACTIVITIES

The following meetings were held at the Sanatorium during the past year:

January 20, the Training School of the Malden Hospital.

January 26, the Training School of the Melrose Hospital.

February 23, the Consultant Nurses of the Department.

March 10 and 17, clinics held for Dr. Robert H. Nichols' class.

May 25, a class from the Tufts Medical School.

July 13, Dr. Harold L. Higgins of the Massachusetts General Hospital with his class in Pediatrics.

November 17, a class from the Harvard School of Public Health.

During the year a course of lectures was given to our medical staff, teachers and nurses on Child Guidance and Mental Hygiene. The lecturers were Miss Parsons of the Massachusetts Society of Mental Hygiene, Dr. Cooper of the Department of Mental Diseases and Miss Bogardus, Psychologist of the Department of Mental Diseases. These lectures were very much worth while and the staff, teachers and nurses became so interested in the subject that they are now attending a course on Practical Mental Hygiene held weekly at the Reading High School. The instructor is Dr. Samuel W. Hartwell, Director of the Worcester Child Guidance.

PERSONNEL CHANGES

The following physicians were appointed as consultants:  
Edward D. Churchill, M.D., Boston, Chest Surgeon; Zabdiel Adams, M.D., Boston, Orthopedist; Halsey B. Loder, M.D., Boston, General Surgeon; Harold L. Higgins, M.D., Boston, Pediatrics; Thomas Odoneal, M.D., Beverly, Eye and Ear; Charles W. DeWolfe, M.D., Wakefield, Nose and Throat.

IMPROVEMENTS AND CHANGES

During the year seven new filter beds have been added to our sewage system, the old beds reconditioned, and a new sludge and dosing tank provided. Sprinkler heads have been installed on all pavilions. Certain hot and cold water lines were replaced in various buildings. The work was completed on replacing two old engines and generators in our power plant. The wooden verandas on wards and certain pavilions were replaced by cement verandas, and repairs were made on sections of the wooden verandas on Pavilions B West and C East. The two wooden water tanks received an outside coat of paint. The domestic tank was painted inside and touched up on the outside.

RECOMMENDATIONS

The old farmhouse and barn should be reshingled and repairs made to the roof of our Administration Building. The old wooden sections of the verandas on Pavilions C East and B West should be replaced with cement verandas.

ACKNOWLEDGMENTS

I wish to thank our clergy, the heads of the various departments and our other employees for their loyalty and cooperation during the year. I am also very thankful to our many friends for their gifts and entertainment, among whom are the Boston Calendonian Club Band, the Highland Lassie Band and the Reading Civic Orchestra.

LABORATORY REPORT

The following examinations were made in our laboratory:

Sputum Examinations:	Positive . . . . .	147	
	Negative . . . . .	675	
		<hr/>	822
Urine analyses . . . . .			1,854
White blood counts . . . . .			114
Red blood counts . . . . .			33
Differential blood counts . . . . .			113
Babcock tests for milk . . . . .			33
Bacterial plate counts for milk . . . . .			33
Throat cultures . . . . .			47
Other cultures and smears . . . . .			125
Widal tests . . . . .			39
Fragility tests . . . . .			1
Spinal fluids . . . . .			2
Blood coagulation tests . . . . .			6
Posture pictures taken and developed and printed . . . . .			366



## DENTAL REPORT

The following table is a summary of the work done during the year:

Prophylactic treatments . . . . .	687
Fillings (permanent teeth) . . . . .	599
Fillings (temporary teeth) . . . . .	309
Extractions (permanent teeth) . . . . .	394
Extractions (temporary teeth) . . . . .	779
Treatments . . . . .	362
Restorations . . . . .	2
X-rays . . . . .	317
Irrigations . . . . .	449
Visits . . . . .	2,487
New patients . . . . .	226
Dismissals . . . . .	246

## SCHOOL REPORT

Effort has been made to elevate the standard of the Sanatorium school so that it will compare more favorably with the other schools of the State.

In order to remove the stigma of feeble-mindedness, the term extra-curricula has superseded the names of "special" and "opportunity". The Department offers a wider range of training, both in the academic field and in the arts and crafts. A number of children who have had to stay out of school for a long period are being helped to make up their work. As a rule they are very happy in doing this and spare moments are of real value instead of a nuisance.

During the year, mock woodcraft, book mending, writing and printing a school paper, sewing (beginners and advanced), embroidery, crocheting, cooking, candy making and sealing wax craft have been added to the curriculum. These activities are greatly minimizing the discipline problems. The aim is to give every troublesome child some definite interest that may eventually become an avocation.

In August we were very fortunate in securing Miss Labonte, a competent volunteer worker, to assist with the problem children. This position requires a person well trained in child psychology and occupational therapy. It is earnestly hoped that she may be added to our present staff of teachers.

Miss Segal, a graduate of the Wheelock Kindergarten Training School, accepted a position as attendant on Pavilion B East. She has been spending the morning playtime with the children in regular kindergarten activities in Room I in the school building.

## SCHOOL STATISTICS

	Average Daily Attendance	Per Cent of Attendance	Total Membership
Kindergarten . . . . .	20.75	92	23
Grade I . . . . .	25.47	93.8	40
Grade II . . . . .	23.68	94.9	55
Grades III and IV . . . . .	40.51	95	80
Grades V and VI . . . . .	37.69	96.3	48
Grades VII and VIII . . . . .	22.47	98	44
High school . . . . .	18.63	96	37
Average daily attendance for school . . . . .			172.6
Per cent of attendance for school . . . . .			95.58
Total enrollment for school . . . . .			327

Respectfully submitted,

CARL C. MACCORISON,  
Superintendent.

## Statistical Tables

TABLE 1.—Admissions and Discharges

	Males	Females	Totals
Patients in Sanatorium Dec. 1, 1931 . . . . .	140	134	274
Patients admitted from Dec. 1, 1931, to Nov. 30, 1932, incl. . . . .	131	140	271
Patients discharged from Dec. 1, 1931, to Nov. 30, 1932, incl. . . . .	136	128	264
Patients remaining in Sanatorium Nov. 30, 1932 . . . . .	135	146	281
Daily average number patients . . . . .	135.98	135.42	271.40
Deaths (included in number discharged) . . . . .	6	7	13

TABLE 2.—*Classification on Admission*

	Classification on Application Blanks		Our Classification on Admission		Per Cent	
	1931	1932	1931	1932	1931	1932
Minimal . . . . .	33	47	14	22	5.00	8.12
Moderately advanced . . . . .	27	34	19	13	6.78	4.80
Advanced . . . . .	5	4	11	8	3.93	2.95
Unclassified . . . . .	21	19	4	4	1.42	1.48
Childhood type tuberculosis . . . . .	178	152	192	172	68.57	63.47
Malnutrition . . . . .	0	0	9	21	3.22	7.74
No disease . . . . .	0	0	13	15	4.64	5.53
Pleurisy with effusion . . . . .	3	2	2	0	.71	—
Bronchiectasis . . . . .	1	0	0	2	—	.74
Empyema . . . . .	0	0	2	0	.71	—
Lung abscess . . . . .	1	0	1	1	.36	.37
Hypertrophied tonsils . . . . .	0	0	1	0	.36	—
Tuberculosis of meninges . . . . .	0	0	1	1	.36	.37
Tuberculosis of pleura . . . . .	0	0	1	0	.36	—
Military tuberculosis . . . . .	1	0	0	0	—	—
Tuberculosis cervical glands . . . . .	1	0	0	0	—	—
Pulmonary tuberculosis . . . . .	2	2	*	*	*	*
Chronic cardiac valv. diseases . . . . .	0	0	1	0	.36	—
Observation . . . . .	2	11	0	0	—	—
Deferred . . . . .	0	0	9	8	3.22	2.95
Tuberculosis cervical adenitis . . . . .	0	0	0	1	—	.37
Nephritis . . . . .	0	0	0	1	—	.37
Broncho-pneumonia . . . . .	0	0	0	2	—	.74
	280	271	280	271		

\*Classification not used.

TABLE 3.—*Civil Condition of Patients Admitted*

	Males	Females	Totals
Single . . . . .	131	140	271
Total . . . . .	131	140	271

TABLE 4.—*Age of Patients Admitted*

	Males	Females	Totals	Per Cent
Under 5 years . . . . .	31	24	55	20.3
5 to 9 years . . . . .	44	44	88	32.5
10 to 14 years . . . . .	46	51	97	35.8
15 to 19 years . . . . .	10	21	31	11.4
20 years and over . . . . .	0	0	0	—
Average age . . . . .	8.83	9.95	9.30	—
Total . . . . .	131	140	271	100.0

TABLE 5.—*Nativity and Parentage of Patients Admitted*

PLACE OF NATIVITY	MALES			FEMALES			TOTAL		
	Patient	Father	Mother	Patient	Father	Mother	Patient	Father	Mother
United States:									
Massachusetts . . . . .	119	53	60	125	47	53	244	100	113
Other New England States . . . . .	4	10	9	6	8	12	10	18	21
Other States . . . . .	4	9	2	4	14	10	8	23	12
	127	72	71	135	69	75	262	141	146
Other Countries:									
Armenia . . . . .	0	0	1	0	2	2	0	2	3
Azores . . . . .	0	2	0	0	0	0	0	2	0
Canada . . . . .	1	20	21	3	18	16	4	38	37
Cape Verde . . . . .	0	0	0	0	2	2	0	2	2
Denmark . . . . .	0	0	0	0	1	0	0	1	0
England . . . . .	1	3	2	0	0	2	1	3	4
Finland . . . . .	0	1	1	0	0	0	0	1	1
Germany . . . . .	0	0	1	0	0	1	0	0	2
Greece . . . . .	0	0	0	0	4	4	0	4	4
Ireland . . . . .	0	11	14	1	11	12	1	22	26
Italy . . . . .	0	13	12	1	15	9	1	28	21
Lithuania . . . . .	0	0	0	0	3	3	0	3	3
Newfoundland . . . . .	0	1	3	0	2	2	0	3	5
Poland . . . . .	0	0	0	0	5	5	0	5	5
Portugal . . . . .	0	0	0	0	2	1	0	2	1
Russia . . . . .	0	1	2	0	2	2	0	3	4
Scotland . . . . .	0	0	1	0	1	2	0	1	3
Sweden . . . . .	0	2	0	0	0	0	0	2	0
Unknown . . . . .	2	4	2	0	3	2	2	7	4
Total Foreign . . . . .	4	59	60	5	71	65	9	130	125
Grand Total . . . . .	131	131	131	140	140	140	271	271	271

TABLE 6.—*Residence of Patients Admitted*

Acton . . . . .	1	Chelsea . . . . .	4	Methuen . . . . .	1	Seekonk . . . . .	1
Amesbury . . . . .	5	Concord . . . . .	3	Milford . . . . .	2	Somerville . . . . .	6
Andover . . . . .	1	Dracut . . . . .	3	Milton . . . . .	1	Stoughton . . . . .	3
Arlington . . . . .	3	Everett . . . . .	5	Natick . . . . .	2	Wakefield . . . . .	1
Attleboro . . . . .	1	Haverhill . . . . .	15	Newburyport . . . . .	3	Walpole . . . . .	1
Belmont . . . . .	1	Hudson . . . . .	1	Newton . . . . .	4	Waltham . . . . .	3
Bolton . . . . .	1	Ipswich . . . . .	2	No. Attleborough . . . . .	1	Watertown . . . . .	8
Boston . . . . .	80	Lawrence . . . . .	9	Norwood . . . . .	1	Wayland . . . . .	1
Boxford . . . . .	1	Lowell . . . . .	4	Plymouth . . . . .	1	Wenham . . . . .	1
Braintree . . . . .	3	Lynn . . . . .	10	Quincy . . . . .	6	Weymouth . . . . .	3
Brockton . . . . .	1	Malden . . . . .	13	Reading . . . . .	3	Wilmington . . . . .	1
Burlington . . . . .	1	Medfield . . . . .	1	Revere . . . . .	5	Wrentham . . . . .	2
Cambridge . . . . .	19	Medford . . . . .	15	Salem . . . . .	3		
Canton . . . . .	2	Medway . . . . .	1	Saugus . . . . .	1	Total . . . . .	271

TABLE 7.—*Stage of Disease on Admission*

	Males	Females	Totals	Percentages
Childhood tuberculosis . . . . .	90	82	172	63.47
Minimal . . . . .	5	17	22	8.12
Moderately advanced . . . . .	3	10	13	4.79
Advanced . . . . .	2	6	8	2.95
Tuberculosis of meninges . . . . .	1	0	1	.37
Tuberculous cervical adenitis . . . . .	1	0	1	.37
Malnutrition . . . . .	12	9	21	7.74
No disease . . . . .	7	8	15	5.54
Lung abscess . . . . .	0	1	1	.37
Nephritis . . . . .	0	1	1	.37
Bronchiectasis . . . . .	1	1	2	.74
Broncho-pneumonia . . . . .	1	1	2	.74
Unclassified . . . . .	3	1	4	1.48
Deferred . . . . .	5	3	8	2.95
Total . . . . .	131	140	271	100.00

TABLE 8.—*Condition on Discharge*

	Males	Females	Totals	Percentages
Apparently well . . . . .	19	18	37	14.02
Arrested . . . . .	62	8	70	26.52
Apparently arrested . . . . .	21	55	76	28.79
Quiescent . . . . .	3	12	15	5.68
Improved . . . . .	12	12	24	9.09
Unimproved . . . . .	4	12	16	6.06
Died . . . . .	6	7	13	4.92
Not considered . . . . .	9	4	13	4.92
Total . . . . .	136	128	264	100.00

TABLE 9.—*Deaths*

DURATION OF DISEASE	Males	Females	Totals	LENGTH OF RESIDENCE AT SANATORIUM		
				Males	Females	Totals
Under 1 month . . . . .	0	1	1	2	1	3
1 to 2 months . . . . .	0	0	0	0	0	0
2 to 3 months . . . . .	0	0	0	1	0	1
3 to 4 months . . . . .	0	0	0	1	0	1
4 to 5 months . . . . .	1	0	1	0	0	0
5 to 6 months . . . . .	0	0	0	0	0	0
6 to 7 months . . . . .	1	0	1	0	0	0
7 to 8 months . . . . .	0	0	0	1	0	1
8 to 9 months . . . . .	0	0	0	0	1	1
9 to 10 months . . . . .	0	0	0	1	1	2
10 to 11 months . . . . .	0	0	0	0	0	0
11 to 12 months . . . . .	1	0	1	0	0	0
12 to 18 months . . . . .	0	0	0	0	1	1
18 to 24 months . . . . .	0	1	1	0	1	1
Over 2 years . . . . .	3	5	8	0	2	2
Total . . . . .	6	7	13	6	7	13

TABLE 10.—*Causes of Death*

	Males	Females	Totals
Tuberculosis of lungs . . . . .	5	6	11
Tuberculosis of meninges . . . . .	1	0	1
Broncho-pneumonia . . . . .	0	1	1
Total . . . . .	6	7	13



# Financial Report, North Reading State Sanatorium, 1932

To the Department of Public Health:

I respectfully submit the following report of the finances of this institution for the fiscal year ending November 30, 1932.

## STATEMENT OF EARNINGS

Board of patients:		
Private	\$4,959 00	
Cities and towns	78,295 00	\$83,254 00
Personal services:		
Reimbursement from Board of Retirement		100 57
Sales:		
Food	\$14 50	
Clothing and materials	268 35	
Furnishings and household supplies	76 15	
Medical and general care	159,28	
Farm	32 75	
Garage, stable and grounds	61 44	
Repairs, ordinary	6 60	
Miscellaneous, junk	37 67	
Total sales		\$656 74
Miscellaneous:		
Interest on bank balances	\$154 79	
Total, miscellaneous		\$154 79
Total earnings for the year		\$84,166 10
Total cash receipts reverting and transferred to the State Treasurer		77,443 22
Accounts receivable outstanding Dec. 1, 1931	\$23,713 95	
Accounts receivable outstanding Nov. 30, 1932	16,991 07	
Accounts receivable decreased		6,722 88

## MAINTENANCE APPROPRIATION

Balance from previous year, brought forward		\$2,497 37
Appropriation, current year	\$235,150 00	235,150 00
Total		\$237,647 36
Expenditures as follows:		
Personal services	\$149,515 98	
Food	36,969 06	
Medical and general care	6,014 83	
Farm	2,527 97	
Heat, light and power	8,799 90	
Garage, stable and grounds	1,359 27	
Travel, transportation and office expenses	2,757 55	
Religious instruction	1,600 00	
Clothing and materials	2,370 50	
Furnishings and household supplies	6,205 78	
Repairs, ordinary	3,939 64	
Repairs and renewals	6,854 49	
Total Maintenance Expenditures		\$228,914 97
Balance of Maintenance Appropriation, Nov. 30, 1932		\$8,732 39
Estimated Outstanding Liabilities, Nov. 30, 1932		\$4,745 15

## SPECIAL APPROPRIATIONS

Balance December 1, 1931, brought forward		\$11,155 47
Appropriations for current year		17,000 00
Total		\$28,155 47
Expended during the year (see statement below)	\$24,119 95	
Reverting to Treasury of Commonwealth	* 14 79	
(Star balances below that are reverting)		24,134 74
Balance November 30, 1932, carried to next year		\$4,020 73

APPROPRIATION	Act or Resolve	Total Amount Appropriated	Expended during Fiscal Year	Total Expended to Date	Balance at End of Year
Addition to Nurses' Home	115—'30	\$20,000 00	\$117 88	\$20,000 00	*
Employees' Building	{ 115—'30 170—'32	75,000 00	3,534 68	72,366 01	\$2,633 99
Power House alterations	115—'30	40,000 00	29	40,000 00	*
Improvement, water supply and fire protection	{ 115—'30 245—'31	42,700 00	1,857 16	42,605 31	94 69
Addition to Dining room	115—'30	4,000 00	13 57	4,000 00	*
Admission and Isolation Building	{ 146—'29 —'31	172,000 00	2,776 07	171,873 29	126 71
Repairs and improvements	245—'31	8,600 00	—	8,599 57	43
Certain Filter Beds	69—'32	17,000 00	15,835 09	15,835 09	1,164 91
		\$379,300 00	\$24,134 74	\$375,279 26	\$4,020 73

## PER CAPITA

During the year the average number of patients has been . . . . .		271 49
Total cost of maintenance . . . . .	\$228,914 97	
Equal to a weekly per capita cost of (52 weeks to year) . . . . .	16 22	
Total receipts for the year . . . . .	77,443 22	
Equal to a weekly per capita of . . . . .	5 49	
Total net cost of maintenance for year (total maintenance less total receipts) . . . . .		\$151,471 75
Net weekly per capita . . . . .	10.7294	

Respectfully submitted,

ETHEL M. KNIGHT,  
Treasurer.

## Inventory: North Reading State Sanatorium

## GRAND SUMMARY SHEET

November 30, 1932.

## REAL ESTATE

Land, 101.75 acres . . . . .	\$4,901 31	
Buildings . . . . .	666,497 52	
Betterments (additions and improvements) . . . . .	163,060 98	
Total . . . . .		\$834,459 81

## PERSONAL PROPERTY UNDISTRIBUTED SUPPLIES

Travel, transportation and office expenses . . . . .	\$124 80	
Food . . . . .	4,315 43	
Clothing and materials . . . . .	3,107 80	
Furnishings and household supplies . . . . .	2,579 18	
Medical and general care . . . . .	437 67	
Heat, light and power . . . . .	1,410 10	
Farm . . . . .	245 77	
Garage, stable and grounds . . . . .	71 07	
Repairs . . . . .	615 87	
		\$12,907 69

## PERSONAL PROPERTY DISTRIBUTED SUPPLIES

Travel, transportation and office expenses . . . . .	\$3,900 90	
Clothing and materials . . . . .	2,117 35	
Furnishings and household supplies . . . . .	73,532 89	
Medical and general care . . . . .	20,176 21	
Heat, light and power . . . . .	-	
Farm . . . . .	10,863 78	
Garage, stable and grounds . . . . .	7,029 95	
Repairs . . . . .	5,984 26	
Total . . . . .		\$123,605 34

## GRAND SUMMARY

Real Estate — Total . . . . .	\$834,459 81	
Personal Property — Undistributed Supplies, Total . . . . .	12,907 69	
Personal Property — Distributed Supplies, Total . . . . .	123,605 34	
		\$970,972 84

## RUTLAND STATE SANATORIUM

## RESIDENT OFFICERS

ERNEST B. EMERSON, M.D., *Superintendent.*  
 PAUL DUFAULT, M.D., *Assistant Superintendent.*  
 ARMAND LAROCHE, M.D., *Senior Physician.*  
 GABRIEL NADEAU, M.D., *Senior Physician.*  
 CHARLES K. MCCARTHY, M.D., *Assistant Physician.*  
 ISRAEL KAHALAS, M.D., *Assistant Physician.*  
 RUBY DELPHINA MCCARTHY, M.D., *Assistant Physician.*  
 DELYA E. NARDI, R.N., *Principal of the School of Nursing.*  
 RENA BLANCHE NAUSS, R.N., *Assistant Principal of the School of Nursing.*  
 MARGUERITE McNAMARA, *Dietitian.*  
 OLIN C. BLAISDELL, *Steward.*  
 MARY A. BOYLE, *Treasurer.*  
 HARRY U. WENDELL, *Chief Power Plant Engineer.*  
 JOSEPH A. CARROLL, *Head Farmer.*  
 CORA A. PHILLIPS, *Head Housekeeper.*

## NON-RESIDENT OFFICERS

FRANK H. WASHBURN, M.D., *Senior Physician, Surgeon.*EDWARD D. CHURCHILL, M.D., *Senior Physician, Thoracic Surgeon.*G. ARNOLD RICE, M.D., *Senior Physician, Consulting Laryngologist.*WILLIAM J. O'CONNOR, D.M.D., *Dentist.***Report of the Superintendent**TO DR. GEORGE H. BIGELOW, M.D., *Commissioner, Department of Public Health:*

I have the honor to submit the thirty-sixth annual report of the Rutland State Sanatorium for the year ending November 30, 1932.

## FINANCIAL STATEMENT

During the year there has been expended \$285,837.41 for maintenance, a gross weekly per capita cost of \$15.69. There has been expended from Special Appropriation authorized by Chapter 146, Acts 1929, Water Supply and Sprinkler Heads, \$7.42; from Special Appropriation authorized by Chapter 115, Acts 1930, Medical and Surgical Building, \$947.83; from Special Appropriations authorized by Chapter 268, Acts 1931, Cow Barn, \$3,472.53, by Chapter 245, Acts 1931, Electrical Equipment, \$6,035.16.

There has been collected from miscellaneous sources (the total of all collections) \$220,524.34, a decrease of 14.9 per cent under the collections of last year. Deducting this amount from the gross maintenance expense leaves a net expense of \$65,313.07, a net weekly per capita cost of \$3.59. There has been collected from private sources, \$15,438.00; from cities and towns, \$75,245.50; from Worcester County, \$42,992.50; from Middlesex County, \$78,941.25; from the Tuberculosis Hospital District of Chelsea, Revere and Winthrop, \$6,352.50; from the Attorney General, \$655.00.

Sixty-three cases were supported wholly or in part from private funds; fifty-three cases by cities and towns; fifty-one wholly by the State; fifty-four by Middlesex County; seventy-two by Worcester County; forty-nine by the Tuberculosis Hospital District of Chelsea, Revere and Winthrop. There were thirty-one cases on which settlement had not been determined.

## POPULATION

There were 305 patients in the sanatorium at the beginning of the year and 368 at the close. The largest number present at one time was 376 and the smallest 305. The daily average number of patients was 350.40, a decrease of 11.30 from last year. There were 393 patients admitted during the year, 104 more than last year; 44 minimal, 155 moderately advanced, 159 far advanced, 17 unclassified, 7 childhood type, 3 carcinoma, 6 bronchiectasis, 1 fibrosarcoma and 1 tuberculous pleurisy. There were 207 admitted from cities and towns of over 25,000 population and 186 from cities and towns under 25,000 population. The average age of patients admitted was 30.86, an increase of .88. Including deaths, there were 330 patients discharged, 16 less than last year. The average duration of residence was 347 days, 214 less than last year. Of those discharged, 164 gained 1,624 pounds, an average gain of 9.90 pounds per person. Of the discharged, there were 3 arrested cases, 5 less than last year; 9 apparently arrested cases, 3 more than last year; 125 quiescent cases, 28 less than last year; 40 improved; 51 unimproved; 13 not considered, the duration of treatment being less than one month. There were 10 discharged non-tuberculous. There were 79 deaths, 36 more than last year. There were 128,247 days of treatment, 3,774 days less than last year. The decrease in the number of patients in the sanatorium at the beginning of the year with the subsequent decrease in the daily average and the number of hospital days was the result of a large transfer of patients to the Middlesex County Sanatorium at the end of last year.

Average number of employees and officers during the year: males 123.75, females 80.15, total 203.90.

Further statistical details are shown in the tables which are a part of this report.

## MEDICAL REPORT

During the year consultation clinics have been held monthly in Gardner, Milford, Framingham and Clinton, and a school clinic in Orange. The consultation clinics



render a real service to the public as may be noted by reference to the tables. It is interesting to note that thirty-one more physicians than last year referred patients to these clinics.

Papers prepared during the year:

"Rest Treatment in Pulmonary Tuberculosis." Paul Dufault, M.D. (Read at the meeting of the American Sanatorium Association, Eastern Section.)

"Basal Pulmonary Lesions." Paul Dufault, M.D. *The American Review of Tuberculosis*, January, 1932.

#### INSTITUTIONAL ACTIVITIES

The Training School is in its twenty-fifth year.

Lectures and demonstrations have been given by the medical staff and special instruction by the following: Mrs. Helen Hackett, Public Health Nursing; Dr. Nels A. Nelson, Venereal Diseases; Dr. M. Luise Diez, Hygiene; Miss Nathalie B. Upton, Social Service.

The hospital affiliations are:

Cooley-Dickinson Hospital	8 months
Boston City Hospital	12 months
Boston Floating Hospital	3 months
North Reading State Sanatorium	3 months

Graduation exercises were held November 3, 1932. The address was given by Miss Elizabeth Ross, President of the Massachusetts State Nurses' Association. The following were awarded diplomas:

Teresa Agnes Leamy	Leo Francis Bracelan
Ruth Sherman Carr	Pauline Elizabeth Nardi
Margaret Anna Blakeley	Anna Mae Silan
Marguerita Hanley	Harriet Mary Sullivan
Marjorie Arleen Rainault	Thomas P. Hanley
Gladys Rena Maxwell	

A six months' postgraduate course in tuberculosis nursing, open to graduates of recognized training schools, has been established. The following have been awarded diplomas after completing this course: Ruby G. Stevens, a graduate of the Worcester City Hospital Training School and Amy Oberempt, a graduate of the Cooley-Dickinson Hospital, Northampton.

Certificates for the two-year attendant course were awarded to Helen Spahl and Eunice Harris.

There were 36 student nurses: 9 probationers, 5 juniors, 16 intermediates and 6 seniors.

Dr. Robert H. Nichols and Dr. Moses J. Stone brought postgraduate and fourth year classes to the sanatorium. Clinics were held by these physicians and members of the staff.

Meetings of the Wachusett Medical Improvement Society, the Advisory Council of the Division of Tuberculosis and the Schnectady County Farm Bureau of New York were held during the year.

#### PERSONNEL CHANGES

In contrast with previous years, marked either by resignations or vacancies at the beginning of the year, there have been no changes in the personnel of the medical staff. I believe this continuity of service is reflected in both the amount and the quality of the medical work of the year.

#### IMPROVEMENTS AND CHANGES

The old pasteurizer has been replaced by new and modern equipment.

A talking machine has been added and a centralized radio is in the process of installation.

Under Chapter 170, Acts 1932, new X-ray equipment has been installed.

Under Chapter 245, Acts 1931, the entire electrical equipment of the sanatorium has been changed from direct to alternating current. All electric current is now purchased from the Gardner Electric Company. This change has reduced the

engine room force from 11 to 8 men. For emergency purposes, one generating unit of the original power plant installation was held in reserve.

#### RECOMMENDATIONS

The staff dining room is now very much overcrowded and should be enlarged by an extension on the east side. I recommend an appropriation of \$1,500 for this purpose.

The present milking machine is obsolete and worn out. I recommend \$1,100 for the purchase of a new milking machine.

The piggery should be repaired and remodelled to facilitate earlier breeding, in order that the young pigs may come in February and March and mature sufficiently to be turned out earlier in the spring. Whatever time for pasture feeding is made available supplements the garbage from the sanatorium and is a profitable investment. I recommend \$1,000 for this work.

I endorse the recommendation of the Division of Engineering to extend the fire service main to the farm buildings, and the installation of more hydrants for the sum of \$3,415. At this point, and since the beginning of this report, the sprinkler system has justified its installation. A fire started in an employee's room but was held in check by the sprinkler head, undoubtedly preventing a more disastrous fire.

#### ACKNOWLEDGMENTS

The Reverend Robert French, the Reverend Father McNamara, the Reverend Father Smith and Rabbi Zeldner have again served for the spiritual needs of another year. They have brought good cheer and renewed courage not only to patients but to employees.

The medical staff, nurses and employees, as in the past, have rendered loyal and heartfelt cooperation.

Clinton W. Putnam, Operating Engineer, and William J. Curtis, Carpenter, were retired after services of 33 and 34 years respectively. I wish to bear witness that such long service and loyalty to the interests of the institution deserve recognition.

I am again grateful for your continued confidence and support of the past year.

Respectfully,

ERNEST B. EMERSON, M.D.

*Superintendent.*

#### SURGICAL REPORT

The following is a list of the surgical operations performed at the Sanatorium:

Appendectomy . . . . .	18
Nephrectomy . . . . .	3
Orchidectomy . . . . .	3
Incision, perinephritic abscess . . . . .	1
Cystoscopy . . . . .	5
Dilatation and curettage . . . . .	2
Phrenicectomy . . . . .	67
Pneumolysis . . . . .	9
Salpingo-oophorectomy . . . . .	3
Abdominal adhesions severed . . . . .	1
Appendectomy with severing of adhesions . . . . .	1
Bronchoscopy . . . . .	100
Rib resection . . . . .	1
Thoracotomy . . . . .	1
Biopsy . . . . .	3
Adenectomy . . . . .	3
Removal of tumor of head . . . . .	1
Hysterectomy . . . . .	1
Excision of rectal fistula . . . . .	2
Hemorrhoidectomy . . . . .	1
Blood transfusion . . . . .	1
Tonsillectomy . . . . .	1

Total . . . . .	228
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Oleo thorax cases . . . . .	7	Artificial pneumothorax treatments	3,385
Oleo thorax treatments . . . . .	22	Lumbar punctures . . . . .	13
Artificial pneumothorax cases . .	194	Chest aspirations . . . . .	30

The following is a list of the surgical operations performed at the Massachusetts General Hospital:

Thoracoplasty . . . . .	12
Pneumolysis . . . . .	6
Lobectomy . . . . .	2
Total . . . . .	20

LABORATORY REPORT

Urine examinations:	
Routine . . . . .	804
Microscopic examination of sediment . . . . .	642
Qualitative sugar determination and specific gravity . . . . .	2,475
Quantitative sugar determination . . . . .	38
Acetone and diacetic acid test . . . . .	2,345
Benzidin test for occult blood . . . . .	20
Mosenthal test . . . . .	4
Kidney function test . . . . .	9
Bile, indican, etc. . . . .	5
Sputum examinations:	
Routine for tubercle bacilli . . . . .	6,517
Concentration method for tubercle bacilli . . . . .	13
Blood examinations:	
Cultures . . . . .	5
Red cell count . . . . .	498
White cell count . . . . .	1,201
Differential count . . . . .	1,102
Hæmoglobin determination . . . . .	498
Platelet count . . . . .	1
Arneth index . . . . .	1
Coagulation time . . . . .	91
Bleeding time . . . . .	7
Matching . . . . .	6
Typing . . . . .	9
Erythrocyte sedimentation test . . . . .	38
Sugar determination (Folin's method) . . . . .	65
Urea nitrogen . . . . .	7
Widal reaction . . . . .	177
Feces examinations:	
Benzidin test for occult blood . . . . .	11
Ova, tubercle bacilli . . . . .	2
Stomach contents:	
Benzidin test for occult blood . . . . .	1
Pleural fluid examinations:	
Culture . . . . .	20
Smear . . . . .	15
Spinal fluid examinations:	
Chemical . . . . .	3
Cell count . . . . .	7
Differentiation of bacteria:	
By culture . . . . .	48
By smear . . . . .	123
Guinea pig inoculations and autopsies . . . . .	127
Milk examinations:	
Bacteria count . . . . .	109
Percentage of fat . . . . .	96



## Water examinations:

Bacteria count . . . . .	41
For B. Coli . . . . .	60
Pork examinations for <i>Trichinella Spiralis</i> . . . . .	47
Preparation of autogenous vaccine . . . . .	1
Standardization of disinfectants . . . . .	4
Cultures for further examination for <i>B. typhosus</i> :	
From urine . . . . .	67
From feces . . . . .	65
Blood drawn for Wassermann test . . . . .	369
Spinal fluid drawn for Wassermann test . . . . .	4
Spinal fluid drawn for Gold Sol test . . . . .	3
Total number of examinations . . . . .	17,801

Lectures in bacteriology to nurses' training school, 24.

Of the total number of patients in the Sanatorium November 30, 1932 (368), 77% had a positive sputum; 5.4% reported no sputum; tubercle bacilli were not found in 17.6%. Of the total number of patients whose sputum was examined 81.3% were positive.

There were 390 smallpox vaccinations and 390 Typhoid and Paratyphoid A and B inoculations; also 2,180 X-ray plates of chest, stomach, etc., and 223 dental X-rays. Total, 2,403.

The following tables indicate the work of the consultation service, clinics, out-patient and others:

*Consultation Clinics*

Number of patients examined at the Gardner, Milford, Framingham and Clinton clinics, 348.

*Diagnosis:*

Tuberculosis . . . . .	51	Childhood type . . . . .	33
Non-tuberculous . . . . .	74	Lung abscess . . . . .	2
Observation . . . . .	186	Bronchiectasis . . . . .	2

Consultation cases to the number of 348 (11 less than last year) were reported for 383 examinations (15 less than last year) and 21 ex-patients (7 more than last year) reported for 34 follow-up examinations (18 more than last year) making a total of 417 examinations (3 more than last year) at the consultation clinics:

Number of patients examined once, 319; twice, 24; three times, 4; four times, 1.

Number of ex-patients examined once, 13; twice, 5; three times, 2; five times, 1.

Number of physicians referring patients, 94 (10 more than last year).

There were 12 patients admitted to the Sanatorium following examinations at the consultation clinics.

*Sanatorium Out-Patient Clinic*

Patients referred by physicians . . . . .	219
Patients examined at own request . . . . .	82
	301
Ex-patients examined at own request . . . . .	105
Total . . . . .	406

*Diagnosis:*

Tuberculosis . . . . .	73	Tuberculous pleurisy . . . . .	4
Non-tuberculous . . . . .	104	Pleurisy with effusion . . . . .	1
Observation . . . . .	86	Bronchiectasis . . . . .	3
Childhood type . . . . .	22	Lung abscess . . . . .	1

294

This year 294 patients (79 more than last year) reported for 320 examinations (88 more than last year), and 107 ex-patients (12 less than last year) reported for 141 examinations (9 less than last year), making a total of 461 examinations at the Sanatorium.

Number of patients examined once, 269; twice, 24; three times, 1.

Number of ex-patients examined once, 77; twice, 26; three times, 4.

Number of physicians referring patients to the Sanatorium, 122 (21 more than last year).

The following table indicates the work of the school clinic which was held in Orange:

*Diagnosis:*

Tuberculosis . . . . .	1	Childhood type . . . . .	1
Non-tuberculous . . . . .	8	Positive cases re-	
Observation . . . . .	11	examined . . . . .	4
			<hr/>
			25

The total of all examinations made during the year exclusive of routine work was 903.

### DENTAL REPORT

The following is a summary of the dental work done during the year:

Office visits . . . . .	2,961	Impacted teeth treated . . . . .	7
Treatments . . . . .	1,053	Cysts lanced . . . . .	2
New patients . . . . .	261	Extractions in bed . . . . .	16
Pyorrhœa . . . . .	41	Impacted teeth extracted . . . . .	8
Stomatitis . . . . .	32	Tuberculous stomatitis cases . . . . .	2
Gingivitis . . . . .	48	Irrigations . . . . .	32
Vincent's Disease . . . . .	18	Exostosis . . . . .	4
Bridges fitted . . . . .	4	Bone dissection . . . . .	1
Plates trimmed . . . . .	63	Gutta percha fillings . . . . .	317
Plates fitted . . . . .	33	Bridges removed . . . . .	14
Bed cases . . . . .	31	Gangrene stomatitis . . . . .	2
Bites for plates . . . . .	29	Vulcanite stomatitis . . . . .	4
Hemorrhages checked . . . . .	3	Tuberculous ulcers on cheek . . . . .	1
Surgical removal . . . . .	1	Emergency cases . . . . .	3
Gum cases lanced . . . . .	9	Silver fillings . . . . .	333
Restorations . . . . .	39	Cement fillings . . . . .	86
Sockets curretted . . . . .	4	Porcelain fillings . . . . .	58
Ankylosis . . . . .	2	Osteomyelitis treatments . . . . .	1
Trismus . . . . .	1	Erosion treatments . . . . .	1
Prophylaxis treatments . . . . .	122	Nerves removed . . . . .	2
Fillings . . . . .	794	Filling root canal . . . . .	1
Extractions under novocaine . . . . .	305	Remaking plate . . . . .	1
Gum treatments . . . . .	301	Lancing impacted teeth . . . . .	9
Post extraction treatments . . . . .	207	Polaris treatments . . . . .	38
Impressions . . . . .	39	Fractured root . . . . .	1
Plates repaired . . . . .	9	Resetting . . . . .	1
Mouth washes . . . . .	630	Recementing bridge . . . . .	1
Gold inlays . . . . .	18	Crown removals . . . . .	4
Abscess treatments . . . . .	22	Rebasing plates . . . . .	2
Bridges cemented . . . . .	2	Aristol treatment . . . . .	1
Crowns . . . . .	13	Porcelain inlay . . . . .	1
Process removed from molar region . . . . .	3	Clasps repaired . . . . .	1
Partial plates readjusted . . . . .	3	Polishing plate . . . . .	1
Clasp on partial plate . . . . .	2	Porcelain facing . . . . .	1
Scaling teeth . . . . .	60	Palate treated . . . . .	1
Fitting clasps on partial plates . . . . .	2	Crown cemented . . . . .	1

## Statistical Tables

TABLE 1.—*Admissions and Discharges*

	Males	Females	Totals
Patients in Sanatorium Nov. 30, 1931	162	143	305
Patients admitted Dec. 1, 1931, to Nov. 30, 1932, inclusive	197	196	393
Patients discharged Dec. 1, 1931, to Nov. 30, 1932, inclusive	174	156	330
Patients remaining in Sanatorium Nov. 30, 1932	185	183	368
Daily average number of patients	180.38	170.02	350.40
Deaths (included in number discharged)	37	42	79

TABLE 2.—*Classification on Admission*

	Classification on Application Blanks		Our Classification on Admission		Per Cent	
	1931	1932	1931	1932	1931	1932
Minimal	59	86	31	44	10.73	11.20
Moderately advanced	149	201	122	155	42.22	39.44
Far advanced	51	50	119	159	41.17	40.46
Unclassified	28	53	10	17	3.46	4.33
Childhood type	2	3	2	7	.70	1.78
Carcinoma	—	—	—	3	—	.76
Fibrosarcoma	—	—	—	1	—	.25
Tuberculous pleurisy	—	—	1	1	.34	.25
Chronic bronchiectasis	—	—	1	6	.34	1.53
Tuberculous empyema	—	—	2	—	.70	—
Gastric or duodenal ulcer	—	—	1	—	.34	—
	289	393	289	393		

TABLE 3.—*Civil Condition of Patients Admitted*

	Males	Females	Totals
Single	97	122	219
Married	88	63	151
Widowed	11	9	20
Divorced	1	2	3
	197	196	393

TABLE 4.—*Age of Patients Admitted*

	Males	Females	Totals	Percentages
Under 20 years	21	30	51	12.97
20 to 29 years	70	103	173	44.02
30 to 39 years	36	38	74	18.84
40 to 49 years	46	17	63	16.04
50 to 59 years	18	5	23	5.86
60 to 69 years	5	2	7	1.76
70 and over	1	1	2	.51
Average age	33.89	27.82	30.86	
Total	197	196	393	

TABLE 5.—*Nativity and Parentage of Patients Admitted*

PLACES OF NATIVITY	MALES			FEMALES			TOTALS		
	Patients	Fathers	Mothers	Patients	Fathers	Mothers	Patients	Fathers	Mothers
United States:									
Massachusetts	105	31	35	116	35	42	221	66	77
Other New England States	12	8	10	18	18	14	30	26	24
Other States	8	11	6	9	9	7	17	20	13
Total Native	125	50	51	143	62	63	268	112	114
Other Countries (28)									
Total Foreign	72	146	145	53	132	129	125	278	274
Unknown	—	1	1	—	2	4	—	3	5
Grand Totals	197	197	197	196	196	196	393	393	393



TABLE 6.—*Residence of Patients Admitted*

Place	No.	Place	No.	Place	No.	Place	No.
Arlington . . . . .	3	Grafton . . . . .	1	Millbury . . . . .	1	State Farm . . . . .	2
Ashburnham . . . . .	2	Great Barrington . . . . .	1	Needham . . . . .	1	Stockbridge . . . . .	1
Ashland . . . . .	1	Greenfield . . . . .	1	New Bedford . . . . .	1	Stoughton . . . . .	3
Athol . . . . .	8	Hardwick . . . . .	1	New Haven, Conn. . . . .	1	Sutton . . . . .	1
Barre . . . . .	3	Hatfield . . . . .	1	Newburyport . . . . .	1	Taunton . . . . .	1
Billerica . . . . .	1	Hingham . . . . .	1	Newton . . . . .	5	Templeton . . . . .	2
Blackstone . . . . .	3	Holbrook . . . . .	1	North Adams . . . . .	3	Upton . . . . .	1
Boston . . . . .	88	Holden . . . . .	1	North Reading . . . . .	1	Uxbridge . . . . .	3
Braintree . . . . .	1	Holyoke . . . . .	5	Northampton . . . . .	1	Wakefield . . . . .	1
Brookline . . . . .	1	Hopedale . . . . .	4	Northborough . . . . .	1	Waltham . . . . .	1
Cambridge . . . . .	8	Hubbardston . . . . .	1	Northbridge . . . . .	1	Watertown . . . . .	4
Charlemont . . . . .	1	Hudson . . . . .	2	Palmer . . . . .	2	Wayland . . . . .	1
Chelsea . . . . .	22	Lancaster . . . . .	4	Pensacola, Fla. . . . .	1	Webster . . . . .	5
Chicopee . . . . .	6	Leicester . . . . .	1	Pittsfield . . . . .	3	Wellesley . . . . .	1
Clinton . . . . .	3	Leominster . . . . .	12	Providence, R. I. . . . .	1	West Brookfield . . . . .	1
Dedham . . . . .	1	Lexington . . . . .	1	Quincy . . . . .	2	Westfield . . . . .	3
Douglas . . . . .	1	Lowell . . . . .	3	Reading . . . . .	4	Weymouth . . . . .	1
Dracut . . . . .	1	Lunenburg . . . . .	1	Revere . . . . .	25	Winchendon . . . . .	5
Dudley . . . . .	2	Malden . . . . .	1	Royalston . . . . .	1	Winchester . . . . .	1
Easthampton . . . . .	1	Marblehead . . . . .	1	Rutland . . . . .	1	Winthrop . . . . .	5
Everett . . . . .	5	Marlborough . . . . .	1	Salem . . . . .	1	Woburn . . . . .	1
Fall River . . . . .	1	Medford . . . . .	6	Shirley . . . . .	1	Worcester . . . . .	10
Fitchburg . . . . .	4	Medway . . . . .	1	Somerville . . . . .	8	Wrentham . . . . .	2
Framingham . . . . .	6	Melrose . . . . .	3	Southbridge . . . . .	4		
Gardner . . . . .	15	Milford . . . . .	10	Springfield . . . . .	13	Total . . . . .	393

TABLE 7.—*Stage of Disease on Admission*

	Males	Females	Totals	Percentages
Minimal . . . . .	16	28	44	11.20
Moderately advanced . . . . .	79	76	155	39.45
Far advanced . . . . .	82	77	159	40.45
Unclassified . . . . .	7	10	17	4.33
Childhood type . . . . .	5	2	7	1.76
Carcinoma . . . . .	2	1	3	.77
Bronchiectasis . . . . .	5	1	6	1.52
Fibrosarcoma . . . . .	—	1	1	.26
Tuberculous pleurisy . . . . .	1	—	1	.26
	197	196	393	

TABLE 8.—*Condition on Discharge*

	Males	Females	Totals	Percentages
Arrested . . . . .	2	1	3	.91
Apparently arrested . . . . .	2	7	9	2.73
Quiescent . . . . .	83	42	125	37.88
Improved . . . . .	18	22	40	12.13
Unimproved . . . . .	24	27	51	15.45
Not considered . . . . .	5	8	13	3.93
Non-tuberculous . . . . .	3	7	10	3.03
Dead . . . . .	37	42	79	23.94
	174	156	330	

TABLE 9.—*Deaths*

DURATION OF DISEASE	Males	Females	Totals	LENGTH OF RESIDENCE AT SANATORIUM		
				Males	Females	Totals
Under 1 month . . . . .	—	—	—	5	7	12
1 to 2 months . . . . .	—	—	—	4	—	4
2 to 3 months . . . . .	1	1	2	2	5	7
3 to 4 months . . . . .	3	1	4	1	5	6
4 to 5 months . . . . .	—	—	—	3	3	6
5 to 6 months . . . . .	—	—	—	3	3	6
6 to 7 months . . . . .	1	—	1	2	3	5
7 to 8 months . . . . .	1	1	2	1	2	3
8 to 9 months . . . . .	2	1	3	3	1	4
9 to 10 months . . . . .	1	2	3	—	—	—
10 to 12 months . . . . .	1	3	4	—	3	3
12 to 18 months . . . . .	4	8	12	1	2	3
18 to 24 months . . . . .	1	3	4	3	5	8
Over 2 years . . . . .	22	22	44	9	3	12
	37	42	79	37	42	79

TABLE 10.—*Causes of Death*

	Males	Females	Totals
Pulmonary tuberculosis . . . . .	35	39	74
Embolism . . . . .	—	1	1
Carcinoma of lung . . . . .	—	1	1
Tuberculous laryngitis . . . . .	—	1	1
Uremia and pulmonary tuberculosis . . . . .	1	—	1
Multiple abscesses . . . . .	1	—	1
	37	42	79

## Financial Report, Rutland State Sanatorium, 1932

To the Department of Public Health:

I respectfully submit the following report of the finances of this institution for the fiscal year ending November 30, 1932.

### STATEMENT OF EARNINGS

Board of patients:		
Chelsea, Revere and Winthrop	\$37,922 50	
Private	17,317 73	
Cities and towns	93,029 24	
Worcester County	64,885 00	
Middlesex County	33,482 00	
	<u>\$246,636 47</u>	
Personal services:		
Reimbursement from Board of Retirement		\$141 12
Sales:		
Travel, transportation and office expenses	\$13 00	
Food	137 09	
Medical and general care	199 39	
Farm	56 99	
Garage, stable and grounds	129 00	
Repairs, ordinary	32 00	
	<u>\$567 47</u>	
Miscellaneous:		
Interest on bank balances	\$189 40	
Rents	10 00	
	<u>\$199 40</u>	
Total, miscellaneous		\$199 40
Total earnings for the year		\$247,544 46
Total cash receipts reverting and transferred to the State Treasurer		220,524 34
Accounts Receivable outstanding Dec. 1, 1931	\$179,962 74	
Accounts Receivable outstanding Nov. 30, 1932	206,982 86	
Accounts Receivable increased		27,020 12

### MAINTENANCE APPROPRIATION

Balance from previous year, brought forward		\$6,841 00
Appropriation, current year	\$306,050 00	
	<u>306,050 00</u>	
Total		\$312,891 00
Expenditures as follows:		
Personal services	\$177,495 61	
Food	46,926 47	
Medical and general care	11,662 88	
Farm	9,990 22	
Heat, light and power	14,487 85	
Garage, stable and grounds	2,536 69	
Travel, transportation and office expenses	3,519 86	
Religious instruction	1,900 00	
Clothing and materials	108 26	
Furnishings and household supplies	8,680 46	
Repairs, ordinary	4,143 28	
Repairs and renewals	4,385 83	
	<u>\$285,837 41</u>	
Total Maintenance Expenditures		\$285,837 41
Balance of Maintenance Appropriation, Nov. 30, 1932		27,053 59
Estimated Outstanding Liabilities, Nov. 30, 1932		\$9,171 98

### SPECIAL APPROPRIATIONS

Balance December 1, 1931, brought forward		\$12,152 34
Appropriations for current year		7,200 00
		<u>\$19,352 34</u>
Total		\$19,352 34
Expended during the year (see statement below)	\$10,462 94	
Reverting to Treasury of Commonwealth	* 1,573 81	
(Star balances below that are reverting)		12,036 75
Balance November 30, 1932, carried to next year		\$7,315 59

APPROPRIATION	Act or Resolve	Total Amount Ap- propriated	Expended during Fiscal Year	Total Expended to Date	Balance at End of Year
Water Supply and Sprinkler Heads	146-1929	\$15,000 00	\$7 42	\$14,824 66	\$175 34*
Hay Barn, Garage and Equipment	115-1930	22,000 00	-	21,723 52	276 48*
Medical and Surgical Building	115-1930	35,000 00	947 83	34,881 42	118 58*
Lightning Protection	115-1930	6,000 00	-	5,014 16	985 84*
Cow Barn	268-1931	25,000 00	3,472 53	24,982 43	17 57*
Electrical Equipment	245-1931	7,000 00	6,035 16	6,884 41	115 59
X-ray and Other Equipment	170-1932	7,200 00	-	-	7,200 00
		<u>\$117,200 00</u>	<u>\$10,462 94</u>	<u>\$108,310 60</u>	<u>\$8,889 40</u>

## PER CAPITA

During the year the average number of patients has been . . . . .		350 4
Total cost of maintenance . . . . .	\$285,837 41	
Equal to a weekly per capita cost o. (52 weeks to year) . . . . .	15 69	
Total receipts for the year . . . . .	220,524 34	
Equal to a weekly per capita of . . . . .	12 10	
Total net cost of maintenance for year (total maintenance less total receipts) . . . . .		\$65,313 07
Net weekly per capita . . . . .	3 59	

Respectfully submitted,

MARY A. BOYLE,

*Treasurer.*

## Inventory: Rutland State Sanatorium

## GRAND SUMMARY SHEET

November 30, 1932

## REAL ESTATE

Land (364.727 acres) . . . . .	\$54,743 04	
Buildings . . . . .	820,670 53	
Betterments (additions and improvements) . . . . .	10,462 94	
Total . . . . .		\$885,876 51

## PERSONAL PROPERTY UNDISTRIBUTED SUPPLIES

Travel, transportation and office expenses . . . . .	\$354 73	
Food . . . . .	4,118 51	
Clothing and materials . . . . .	788 22	
Furnishings and household supplies . . . . .	2,156 95	
Medical and general care . . . . .	2,680 46	
Heat, light and power . . . . .	8,518 83	
Farm . . . . .	5,801 75	
Garage, stable and grounds . . . . .	65 37	
Repairs . . . . .	3,687 44	
Total . . . . .		\$28,172 26

## PERSONAL PROPERTY DISTRIBUTED SUPPLIES

Travel, transportation and office expenses . . . . .	\$1,438 12	
Clothing and materials . . . . .	133 55	
Furnishings and household supplies . . . . .	32,262 27	
Medical and general care . . . . .	7,728 69	
Heat, light and power . . . . .	-	
Farm . . . . .	31,142 39	
Garage, stable and grounds . . . . .	1,252 25	
Repairs . . . . .	2,047 49	
Total . . . . .		\$76,004 76

## GRAND SUMMARY

Real Estate — Total . . . . .		\$885,876 51
Personal Property — Undistributed Supplies, Total . . . . .		28,172 26
Personal Property — Distributed Supplies, Total . . . . .		76,004 76
		<u>\$990,053 53</u>

## WESTFIELD STATE SANATORIUM

## RESIDENT OFFICERS

ROY MORGAN, M.D., *Superintendent.*HEMAN B. CHASE, M.D., *Assistant Superintendent.*J. ERNEST LANDRY, M.D., *Senior Physician.*BERNARD GOLDBLATT, M.D., *Assistant Physician.*ELIOT H. LUTHER, M.D., *Assistant Physician.*GEORGE E. CROWELL, D.M.D., *Dentist.*BESSIE MACDONALD, R.N., *Superintendent of Nurses and Matron.*JOSEPHINE E. FRENCH, *Treasurer.*JOHN E. KINSELLA, *Steward.*BENJAMIN J. SANDIFORD, *Chief Engineer.*WILLIAM G. ATKINSON, *Head Farmer.*

## NON-RESIDENT OFFICERS

M. ARCHIBALD DECHTER, M.D., *Consultant in Diseases of the Eyes, Ears,  
Nose and Throat.*DR. A. D. ROOD, *Consultant in Bronchoscopy.*



## Report of the Superintendent

To DR. GEORGE H. BIGELOW, *Commissioner, Department of Public Health:*

I have the honor to submit the twenty-third annual report of the Westfield State Sanatorium for the year ending November 30, 1932.

### FINANCIAL STATEMENT

During the year there has been expended \$236,583.07 for maintenance, a gross weekly per capita cost of \$17.47. There has been expended from Special Appropriation authorized by Chapter 245, Acts 1931, Employees' Dormitory \$54,767.19; from X-ray and other equipment, \$4,085.25; and from Equipment for Water Supplies, \$1,476.43,—total, \$60,328.87.

There has been collected from miscellaneous sources (the total of all collections) \$75,807.98. Deducting this amount from the gross maintenance expense leaves a net expense of \$160,775.09, a net weekly per capita cost of \$11.87. There has been collected from private sources \$4,165.00; from cities and towns \$97,612.07.

Seven cases were supported wholly or in part from private funds; 125 cases by cities and towns; 43 wholly by the State, and 22 by the Department of Public Welfare, Division of Child Guardianship. There were 58 cases on which settlements had not been determined.

### POPULATION

There were 197 patients admitted during the year and 215 were discharged. There were 255 remaining at the end of the year. The daily average number of patients was 260.37. The average number of employees and officers during the year was 142. One hundred and fifteen cases were admitted from cities and towns of over 25,000 population and 82 from cities and towns of less than 25,000. The average age of patients was 11.7 years. The average length of stay of patients discharged, including deaths, was 488 days. Of the 215 discharged cases, 12 were apparently well, 126 apparently arrested, 46 improved and 15 unimproved, 10 were not considered as they stayed less than 30 days, and there were 6 deaths.

### MEDICAL REPORT

Our medical work has not been essentially changed during the year. In our pulmonary cases we are still relying on bed rest supplemented by pneumothorax treatment as indicated. Our principal difficulty has been in deciding when pneumothorax treatment should be instituted. In adolescents pulmonary tuberculosis is very prone to sudden spread and this may occur without symptoms. This has forced us to the more frequent use of the X-ray and we have now come to the point of X-raying most of our pulmonary cases every month. We feel that our results will be considerably better under this plan. Fortunately we are now getting our pulmonary cases much earlier. Many of our cases are discovered in the school clinics before they have developed symptoms. This case finding should be pushed vigorously as pulmonary tuberculosis in adolescents is too often fatal unless discovered quite early.

Our experience with contagious diseases has been very fortunate during the year. We had one case of scarlet fever in July and during the fall had several cases of chicken pox. Otherwise we have had no contagious diseases.

Our out-patient work has increased considerably as shown in the table below:

1924 . . . . .	241	1929 . . . . .	1,341
1925 . . . . .	396	1930 . . . . .	1,518
1926 . . . . .	441	1931 . . . . .	1,633
1927 . . . . .	743	1932 . . . . .	2,016
1928 . . . . .	1,077		

The great majority of these have been sent by their family physicians or by some legitimate organization. We are also giving pneumothorax treatment to 5 out-patients, these being discharged cases from Rutland State Sanatorium.

We have continued to cooperate with the Hampden County Tuberculosis Association in conducting clinics throughout the county. We have furnished them with medical service in 13 of these clinics for the examination of 992 patients. In

these clinics 665 X-ray films were taken and 514 examinations made. Ten new pulmonary cases were found and 22 new hilum cases; 203 were suspicious.

We have also furnished medical service for Camp Keepwell which is operated by the County Association. This camp was operated for nine weeks this year instead of the customary eight weeks and cared for a total of 562 children.

#### DENTAL REPORT

The following table shows the work done in the dental clinic during the year:

Prophylactic treatments, 1,065; fillings—permanent teeth, 934; fillings—temporary teeth, 71; extractions—permanent teeth, 168; extractions—temporary teeth, 88; treatments, 174; restorations, 3; X-rays, 62; surgical extractions, 5; examinations, 712. Total, 3,282.

#### SCHOOL REPORT

Average daily attendance from December, 1931, to December, 1932:

Grade I . . . . .	24.52	Grade VI . . . . .	16.27
Grade II . . . . .	17.76	Grade VII . . . . .	12.90
Grade III . . . . .	18.44	Grade VIII . . . . .	13.39
Grade IV . . . . .	21.69	Manual Training . . . . .	17.05
Grade V . . . . .	19.51		
Total average . . . . .			161.53
Total enrollment . . . . .			314

#### PERSONNEL CHANGES

Dr. J. Howard Howe resigned May 1, 1932. His place was taken by Dr. Eliot H. Luther who came on June 1, 1932; otherwise there has been no important change in personnel.

#### IMPROVEMENTS

The new employees' building was completed and was occupied in June. New X-ray equipment was installed in February and that department is now in very satisfactory condition. In November a new moving picture machine was bought.

#### RECOMMENDATIONS

We have no special recommendations. No new building will be needed for some time and only a few items have been included in our budget for repairs and renewals.

#### ACKNOWLEDGMENTS

I wish to commend our clergymen and our employees for their loyal support during the year, and to thank you and other members of the Department for your uniform courtesy and cooperation.

ROY MORGAN, M D.

*Superintendent.*

### Financial Report, Westfield State Sanatorium, 1932

*To the Department of Public Health:*

I respectfully submit the following report of the finances of this institution for the fiscal year ending November 30, 1932.

#### STATEMENT OF EARNINGS

Board of Patients			
Private	\$3,239 00		
Cities and towns . . . . .	76,024 50		
		\$79,263 50	
Personal services:			
Reimbursement from Board of Retirement . . . . .		112 62	
Sales:			
Food . . . . .	\$122 14		
Clothing and materials . . . . .	451 40		
Furnishings and household supplies . . . . .	3 12		
Medical and general care . . . . .	68 91		
Heat, light and power . . . . .	2 50		
Farm . . . . .	785 76		
Garage, stable and grounds . . . . .	57 02		
Arts and crafts sales . . . . .	148 01		
Total Sales . . . . .		\$1,638 86	
Total earnings for the year . . . . .			\$81,014 98
Total cash receipts reverting and transferred to the State Treasurer . . . . .			75,807 98
Accounts receivable outstanding Dec. 1, 1931 . . . . .	\$22,513 57		
Accounts receivable outstanding Nov. 30, 1932 . . . . .	27,720 57		
Accounts Receivable increased . . . . .			\$5,207 00

## MAINTENANCE APPROPRIATION

Balance from previous year, brought forward		\$3,715 17
Appropriation, current year	\$248,690 00	
<b>Total</b>		<b>\$252,405 17</b>
Expenditures as follows:		
Personal services	\$152,038 88	
Food	27,465 22	
Medical and general care	7,310 99	
Farm	8,224 10	
Heat, light and power	14,057 08	
Garage, stable and grounds	3,366 02	
Travel, transportation and office expenses	3,261 00	
Religious instruction	1,194 00	
Clothing and materials	3,345 11	
Furnishings and household supplies	7,225 49	
Repairs, ordinary	6,566 11	
Repairs and renewals	2,529 07	
<b>Total Maintenance Expenditures</b>		<b>\$236,583 07</b>
Balance of Maintenance Appropriation, Nov. 30, 1932		\$15,822 10
Estimated Outstanding Liabilities, Nov. 30, 1932		\$5,328 95

## SPECIAL APPROPRIATIONS

Balance December 1, 1931, brought forward	\$70,402 00
Appropriations for current year	1,500 00
<b>Total</b>	<b>\$71,902 00</b>
Expended during the year (see statement below)	\$60,328 87
Balance November 30, 1932, carried to next year	\$11,573 13

APPROPRIATION	Act or Resolve	Total Amount Appropriated	Expended during Fiscal Year	Total Expended to Date	Balance at end of Year
Clearing land	1931-1	\$6,000 00	-	\$5,970 34	\$29 66
Employees dormitory	1931-245	79,500 00	\$54,767 19	69,464 52	10,035 48
X-ray other equipment	1931-245	6,000 00	4,085 25	4,548 73	1,451 27
Additional sewage	1931-245	5,000 00	-	4,966 85	33 15
Equipment for water supply	1932-170	1,500 00	1,476 43	1,476 43	23 57
		\$98,000 00	\$60,328 87	\$86,426 87	\$11,573 13

## PER CAPITA

During the year the average number of patients has been	260.37
Total cost of maintenance	\$236,583 07
Equal to a weekly per capita cost of (52 weeks to year)	17 473
Total receipts for the year	75,807 98
Equal to a weekly per capita of	5.5980
Total net cost of maintenance for year (total maintenance less total receipts)	\$160,775 09
Net weekly per capita	11.874

Respectfully submitted,

JOSEPHINE E. FRENCH,  
Treasurer.

## Inventory: Westfield State Sanatorium

## GRAND SUMMARY SHEET

November 30, 1932

## REAL ESTATE

Land, 263.06 acres	\$16,540 00
Buildings	400,053 54
Betterments (additions and improvements)	63,596 70
<b>Total, Real Estate</b>	<b>\$480,190 24</b>

## PERSONAL PROPERTY UNDISTRIBUTED SUPPLIES

Travel, transportation and office expenses	\$100 00
Food	3,360 97
Clothing and materials	3,255 98
Furnishings and household supplies	3,164 57
Medical and general care	1,023 24
Heat, light and power	2,888 46
Farm	633 85
Garage, stable and grounds	86 23
Repairs	39 67
	<b>\$14,557 97</b>



PERSONAL PROPERTY DISTRIBUTED SUPPLIES

Travel, transportation and office expenses . . . . .	\$3,623 56	
Clothing and materials . . . . .	729 73	
Furnishings and household supplies . . . . .	38,662 25	
Medical and general care . . . . .	44,059 06	
Heat, light and power . . . . .	4,018 53	
Farm . . . . .	35,140 42	
Garage, stable and grounds . . . . .	8,936 94	
Repairs . . . . .	2,617 38	
Total . . . . .		\$137,787 87

GRAND SUMMARY

Real Estate — Total . . . . .	\$480,190 24	
Personal Property — Undistributed Supplies, Total . . . . .	14,557 97	
Personal Property — Distributed Supplies, Total . . . . .	137,787 87	
		\$632,536 08

Statistical Tables

TABLE 1.—Admissions and Discharges

	Males	Females	Totals
Number of patients admitted Dec. 1, 1931, to Nov. 30, 1932, inclusive . . . . .	96	101	197
Number of patients discharged Dec. 1, 1931, to Nov. 30, 1932, inclusive . . . . .	109	106	215
Number of deaths (including those in previous items) . . . . .	2	4	6
Number in Sanatorium Dec. 1, 1931 . . . . .	122	151	273
Number remaining Nov. 30, 1932 . . . . .	109	146	255

TABLE 2.—Classification on Admission

	Classification on Application Blanks	Our Classification on Admission	Per Cent
Minimal . . . . .	32	22	11.2
Moderately Advanced . . . . .	22	13	6.6
Advanced . . . . .	8	8	4.1
Hilum . . . . .	125	122	61.9
Bronchial Asthma . . . . .		1	.5
Bronchiectasis . . . . .	1	3	1.5
Cervical Adenitis . . . . .	1	1	.5
Feeble-mindedness . . . . .		1	.5
Hemophilia . . . . .		1	.5
Malnutrition . . . . .		8	4.1
No disease . . . . .		4	2.0
Pleurisy . . . . .		1	.5
Pleurisy with effusion . . . . .	2	4	2.0
Pott's disease . . . . .		2	1.0
Pyelitis . . . . .		1	.5
Unclassified . . . . .	6	5	2.5
	197	197	

TABLE 3.—Civil Condition of Patients Admitted

	Males	Females	Totals
Single . . . . .	96	101	197

TABLE 4.—Ages of Patients Admitted

	Males	Females	Totals	Percentages
Under 5 years . . . . .	5	7	12	6.1
5 to 9 years . . . . .	32	29	61	31.0
10 to 14 years . . . . .	38	36	74	37.5
15 to 19 years . . . . .	20	28	48	24.3
20 years and over . . . . .	1	1	2	1.1
Average age . . . . .	11.42	10.83	17.63	—
	96	101	197	100.0

TABLE 5.—*Nativity and Parentage of Patients Admitted*

PLACES OF NATIVITY	MALES			FEMALES			TOTALS		
	Patients	Fathers	Mothers	Patients	Fathers	Mothers	Patients	Fathers	Mothers
United States:									
Massachusetts . . . . .	83	38	38	85	32	33	168	70	71
Other New England States . . . . .	7	9	7	9	9	10	16	18	17
Other States . . . . .	3	13	7	3	4	5	6	17	12
	93	60	52	97	45	48	190	105	100
Other Countries:									
Albania . . . . .	0	0	0	0	2	2	0	2	2
Austria . . . . .	0	1	1	0	0	0	0	1	1
Belgium . . . . .	0	0	0	0	0	2	0	0	2
Canada . . . . .	1	10	18	4	20	21	5	30	39
Denmark . . . . .	0	0	1	0	0	0	0	0	1
England . . . . .	0	1	1	0	0	1	0	1	2
France . . . . .	0	0	0	0	1	0	0	1	0
Finland . . . . .	0	2	2	0	3	2	0	5	4
Germany . . . . .	0	1	0	0	0	0	0	1	0
Greece . . . . .	0	0	0	0	3	3	0	3	3
Holland . . . . .	0	2	2	0	0	0	0	2	2
Ireland . . . . .	0	3	3	0	1	1	0	4	4
Italy . . . . .	1	3	3	0	7	6	1	10	9
Lithuania . . . . .	0	1	1	0	0	0	0	1	1
Poland . . . . .	0	9	9	0	12	10	0	21	19
Portugal . . . . .	0	0	0	0	2	1	0	2	1
Russia . . . . .	0	0	0	0	2	1	0	2	1
Scotland . . . . .	0	2	2	0	0	0	0	2	2
Sweden . . . . .	0	0	0	0	2	1	0	2	1
	2	35	43	4	55	51	6	90	94
Unknown . . . . .	1	1	1	0	1	2	1	2	3
	3	36	44	4	56	53	7	92	97
	96	96	96	101	101	101	197	197	197

TABLE 6.—*Residence of Patients Admitted*

Amesbury . . . . . 1	Fitchburg . . . . . 20	Maynard . . . . . 1	Southbridge . . . . . 2
Amherst . . . . . 1	Framingham . . . . . 2	Medford . . . . . 2	Spencer . . . . . 1
Barre . . . . . 1	Gardner . . . . . 1	Methuen . . . . . 1	Springfield . . . . . 22
Bellingham . . . . . 1	Gill . . . . . 1	Monson . . . . . 1	Stockbridge . . . . . 1
Blackstone . . . . . 1	Grafton . . . . . 1	Natick . . . . . 6	Sutton . . . . . 3
Boston . . . . . 26	Greenfield . . . . . 1	New Bedford . . . . . 1	Taunton . . . . . 2
Brockton . . . . . 5	Hadley . . . . . 1	Newton . . . . . 3	Templeton . . . . . 1
Cambridge . . . . . 1	Holliston . . . . . 1	North Adams . . . . . 2	Townsend . . . . . 1
Cheshire . . . . . 1	Holyoke . . . . . 8	Northampton . . . . . 3	Walpole . . . . . 1
Chicopee . . . . . 9	Lancaster . . . . . 1	Northbridge . . . . . 1	Warren . . . . . 1
Cohasset . . . . . 1	Lanesborough . . . . . 2	Norwell . . . . . 1	Webster . . . . . 1
Dalton . . . . . 1	Lawrence . . . . . 1	Norwood . . . . . 3	Westborough . . . . . 4
Dedham . . . . . 1	Leominster . . . . . 1	Oxford . . . . . 1	Weymouth . . . . . 1
Deerfield . . . . . 1	Lowell . . . . . 1	Palmer . . . . . 3	Winthrop . . . . . 1
Douglas . . . . . 1	Ludlow . . . . . 1	Pittsfield . . . . . 11	Worcester . . . . . 6
Dracut . . . . . 2	Malden . . . . . 1	Quincy . . . . . 3	
Duxbury . . . . . 1	Marlborough . . . . . 5	Revere . . . . . 2	Total . . . . . 197

TABLE 7.—*Stage of Disease on Admission*

	Males	Females	Totals	Percentages
Minimal . . . . .	6	16	22	11.16
Moderately advanced . . . . .	4	9	13	6.60
Advanced . . . . .	3	5	8	4.07
Hilum tuberculosis . . . . .	69	53	122	61.86
Bronchial asthma . . . . .	1	0	1	.51
Bronchiectasis . . . . .	1	2	3	1.53
Cervical adenitis . . . . .	0	1	1	.51
Feeble-mindedness . . . . .	0	1	1	.51
No disease . . . . .	2	2	4	2.03
Malnutrition . . . . .	2	6	8	4.07
Pleurisy with effusion . . . . .	3	1	4	2.04
Pleurisy . . . . .	0	1	1	.51
Pott's disease . . . . .	1	1	2	1.04
Pyelitis . . . . .	0	1	1	.51
Hemophilia . . . . .	1	0	1	.51
Unclassified . . . . .	3	2	5	2.54
	96	101	197	100.00

TABLE 8.—*Condition on Discharge*

	Males	Females	Totals	Percentages
Apparently arrested . . . . .	74	52	126	58.59
Apparently well . . . . .	4	8	12	5.58
Died . . . . .	2	4	6	2.80
Improved . . . . .	21	25	46	21.39
Not considered . . . . .	5	5	10	4.65
Unimproved . . . . .	3	12	15	6.99
	109	106	215	100.00

TABLE 9.—*Deaths*

DURATION OF DISEASE	Males	Females	Totals	LENGTH OF RESIDENCE AT SANATORIUM		
				Males	Females	Totals
1 to 2 months . . . . .	1	0	1	1	0	1
2 to 3 months . . . . .	0	0	0	0	1	1
4 to 6 months . . . . .	0	0	0	0	2	2
7 to 8 months . . . . .	0	2	2	0	0	0
8 to 9 months . . . . .	0	1	1	0	0	0
18 to 24 months . . . . .	0	0	0	1	0	1
Over 2 years . . . . .	1	1	2	0	1	1
	2	4	6	2	4	6

TABLE 10.—*Causes of Death*

	Males	Females	Totals
Pulmonary tuberculosis . . . . .	2	4	6

## PONDVILLE HOSPITAL

## RESIDENT OFFICERS

GEORGE M. SULLIVAN, M.D., *Superintendent*.  
 HOOSIC H. SERUNIAN, M.D., *Senior Physician*.  
 ROY E. MABREY, M.D., *Assistant Physician*.  
 RAYMOND E. MILITZER, M.D., *Assistant Physician*.  
 THOMAS J. ANGLEM, M.D., *Assistant Physician*.  
 JOHN J. DECKER, M.D., *Assistant Physician*.  
 JAMES T. FALLON, M.D., *Pathologist*.  
 MARY A. EPPLING, R.N., *Principal of School of Nursing*.  
 MARION MACKENZIE, *Treasurer*.  
 NEIL FOUNTAIN, *Head Social Service Worker*.  
 MAY E. DONOVAN, *Head Housekeeper*.  
 ERNEST L. GAGE, *Chief Power Plant Engineer*.  
 DANIEL DONOVAN, *Groundskeeper*.

## NON-RESIDENT OFFICERS

ERNEST M. DALAND, M.D., *Chief of Visiting Staff (Surgeon)*.  
 GRANTLEY W. TAYLOR, M.D., *Senior Physician (Assistant Surgeon)*.  
 HORATIO ROGERS, M.D., *Senior Physician (Assistant Surgeon)*.  
 RICHARD DRESSER, M.D., *Senior Physician (Roentgenologist)*.  
 CHARLES E. DUMAS, M.D., *Senior Physician (Assistant Roentgenologist)*.  
 JOE VINCENT MEIGS, M.D., *Senior Physician (Gynecologist)*.  
 LANGDON PARSONS, M.D., *Senior Physician (Assistant Gynecologist)*.  
 ROGER C. GRAVES, M.D., *Senior Physician (Urologist)*.  
 CHARLES J. E. KICKHAM, M.D., *Senior Physician (Assistant Urologist)*.  
 CARL H. ERNLUND, M.D., *Senior Physician (Laryngologist)*.  
 HENRY JACKSON, JR., M.D., *Senior Physician (Internist)*.  
 DUDLEY MERRILL, M.D., *Senior Physician (Assistant Internist)*.  
 JOHN S. HODGSON, M.D., *Senior Physician (Neurological Surgeon)*.  
 ARTHUR M. GREENWOOD, M.D., *Senior Physician (Dermatologist)*.  
 RICHARD H. NORTON, D.M.S., *Senior Physician (Oral Surgeon)*.  
 SHIELDS WARREN, M.D., *Senior Physician (Pathologist)*.  
 VALMORE A. PELLETIER, M.D., *Senior Physician (Assistant Surgeon Out-Patient Department)*.  
 HARRY W. LARDING, D.M.D. (*Dentist*).  
 HUGO B. C. REIMER, M.D., *Senior Physician (Ophthalmologist)*.  
 JAMES C. HUDSON, PH.D. (*Physicist*).



## Report of the Superintendent

TO DR. GEORGE H. BIGELOW, *Commissioner, Department of Public Health:*

I have the honor to submit the sixth annual report of the Pondville Hospital (Norfolk), P. O. Wrentham, Massachusetts, for the year ending November 30, 1932.

### FINANCIAL STATEMENT

During the year, for maintenance there were expended \$239,158.46, representing a gross weekly per capita cost of \$40.06. There were collected from miscellaneous sources \$60,182.39 (total of all collections). Of this sum, \$17,578.42 came from private sources; \$41,995.85 came from cities and towns; \$61.35 came from the State Board of Retirement; \$56.53 was interest on bank account; \$30.00 for room rent; and from sales \$460.24.

Deducting the above total collections from the maintenance expenses leaves a net expense of \$178,976.07, equivalent to a net weekly cost per capita of \$29.98.

Four hundred and twenty-five patients were supported by private funds, 348 by cities and towns, 127 by the State, leaving 42 settlements pending.

From special appropriations, funds have been expended as follows:

For Hospital Unit and Out-patient Department, authorized by Acts of 1929, Chapter 146, and Acts of 1930, Chapter 115 (\$110,500.00), \$260.09.

For Recreation Building authorized by Acts of 1930, Chapter 115 (\$6,000.00), \$6.57.

For New Filter Beds authorized by Acts of 1931, Chapter 245 (\$10,000.00), \$7,458.75.

### POPULATION

On November 30, 1931, 110 patients remained in the hospital. During the year there were 1,013 admissions. Of these, 291 represented readmissions. Patients were received from 140 cities and towns; patients were also received from 16 other State institutions. One hundred and nineteen patients remained in the hospital at the end of the year.

Discharges during the year numbered 1,004. The condition of 194 was the same; 557 were improved; and 253 died. There were 127 autopsies.

The average stay in the hospital was 44.04 days per patient. The smallest number in the hospital on any one day was 101; the largest number 121. The average number of patients per day was 114.16.

Daily average number of officers and employees, 124.99.

### MEDICAL REPORT

The weekly clinic at the hospital was continued through the year with 51 clinics held. Visits to the regular Thursday clinic numbered 2,205, with an average attendance of 43. Patients making their first visit to the clinic numbered 959. Out-patient visits, other than the regular Thursday clinic, numbered 1,296. Of these, 115 were new patients. Total clinic visits, 3,501.

Three hundred and twenty-eight clinic patients subsequently entered the hospital.

#### *X-Ray and Radium:*

Diagnostic X-ray plates taken, 3,971; fluoroscopic examinations, 480; X-ray treatments given, 3,818; radium treatments given, 505.

#### *Operations:*

There have been 832 operations. In addition, there were 6 esophagoscopies; 100 cystoscopies; 45 proctoscopies; 3 bronchoscopies; and 2 pharyngoscopies.

#### *Anesthesias:*

An anesthesia was given 870 times.

### DENTAL REPORT

Prophylaxis, 173; fillings (permanent teeth), 2; extractions (permanent teeth), 712; treatments, 313; X-ray examinations, 27; examinations, 655. Total, 1,883.

Total number of visits, 1,137. Total number of new patients, 595. Total number of dismissals, 285.

## INSTITUTIONAL ACTIVITIES

This year has been characterized by an increase in the activity of all departments of the hospital. The demands on the X-ray service have necessitated an extra visiting day by one of the roentgenologists to interpret films and carry out diagnostic work. An additional fluoroscopic table is of great value. Four 10 mg. platinum radium needles have been purchased. A new radium bomb has been designed by our physicist.

More thorough investigation of obscure conditions is possible since a medical resident has been appointed. This is also an aid in preoperative study and in postoperative complications.

The work in the operating room has grown steadily since more patients with operable disease have been admitted. The appointment of an experienced anesthetist was found necessary.

The out-patient department has grown beyond expectation and the present facilities are taxed to the utmost to care for the patients. About one third of all admissions came from our own clinics. With the increased number of patients with early cancer the follow-up system had to be elaborated. The head social worker has been made director of social service and another field worker added. There are now three in that department.

The number of urological patients has grown rapidly. An assistant urologist has been appointed who holds a second clinic every week.

The morale of the patients and personnel remains high. Organized entertainment and activity have been of great value in this regard. The appearance of the grounds has been improved by landscaping.

We feel that we are utilizing our facilities to the greatest advantage and hope that conditions will permit expansion in the near future.

## PERSONNEL CHANGES

During the year additions and changes were made as follows:

*Visiting Staff:*

Charles J. E. Kickham, M.D., appointed Assistant Urologist. Ovid O. Meyer, M.D., Assistant Internist, succeeded Eugene C. Glover, M.D., deceased. Dudley Merrill, M.D., Assistant Internist, succeeded Ovid O. Meyer, M.D., resigned.

*Resident Staff:*

John J. Decker, M.D., appointed Assistant Physician. Raymond E. Militzer, M.D., succeeded Joseph L. Kennedy, M.D., resigned. Thomas J. Anglem, M.D., succeeded Richard W. Morris, M.D., resigned. James T. Fallon, M.D., Pathologist, succeeded Sylvan H. Robertson, M.D., resigned.

## IMPROVEMENTS AND CHANGES

During the year, the wood porches on all the cottages have been replaced by cement construction which will make them permanent.

The new road around the filter beds was completed during the year.

The water tank used for fire protection has been painted inside and out.

Approximately two acres of land have been cleared up and made into lawn.

The basements of all cottages have been refinished and are now in good repair.

A new water pump is being ordered for the water supply which is in much need of improvement.

## ACKNOWLEDGMENTS

It is a pleasure to acknowledge the work of the chaplains, Rev. Melville Shafer and Rev. Father Mitchell, also the Social Service Committee, and the cooperation of officers and employees of the hospital.

For your cooperation and counsel, I am deeply grateful.

Respectfully submitted,

GEORGE M. SULLIVAN, M.D.,  
Superintendent.

## Statistical Tables

TABLE 1.—*Admissions and Discharges*

	Males	Females	Totals
Patients in hospital December 1, 1931	60	50	110
Patients admitted from December 1, 1931, to November 30, 1932, inclusive	473	540	1,013
Patients discharged from December 1, 1931, to November 30, 1932, inclusive	468	536	1,004
Patients remaining in hospital November 30, 1932	65	54	119
Daily average number of patients	61.58	52.58	114.16
Deaths (included in number discharged)	154	99	253

TABLE 2.—*Readmissions*

	Males	Females	Totals
Total patients treated	533	590	1,123
Less old patients readmitted first time since December 1, 1931	43	67	110
Less other readmissions	87	94	181
Less patients in hospital December 1, 1931	60	50	110
Number new patients admitted from December 1, 1931, to November 30, 1932	343	379	722
Total number different patients treated December 1, 1931, to November 30, 1932	446	496	942

The following tables 3 to 8 inclusive are based on the number of new patients admitted.

TABLE 3.—*Civil Condition of Patients Admitted*

	Males	Females	Totals
Single	69	64	133
Married	190	228	418
Widowed	76	76	152
Divorced	5	7	12
Separated	3	4	7
Totals	343	379	722

TABLE 4.—*Age of Patients Admitted*

	Males	Females	Totals
Under 20 years	5	4	9
20 to 29 years	6	12	18
30 to 39 years	12	50	62
40 to 49 years	52	104	156
50 to 59 years	83	83	166
60 to 69 years	109	72	181
70 to 79 years	60	45	105
80 to 89 years	14	9	23
90 to 99 years	2	0	2
Totals	343	379	722

TABLE 5.—*Nativity of Patients Admitted*

	Males	Females	Total		Males	Females	Total
United States	173	232	405	Latvia	0	1	1
Armenia	1	0	1	Lithuania	4	4	8
Austria	1	0	1	Newfoundland	1	2	3
British West Indies	0	1	1	Norway	2	0	2
Canada	47	53	100	Poland	7	4	11
Cuba	0	1	1	Portugal	3	5	8
Denmark	0	1	1	Rumania	0	1	1
England	19	14	33	Russia	6	8	14
Finland	2	5	7	Scotland	3	4	7
France	1	0	1	Sweden	5	2	7
Germany	2	6	8	Switzerland	1	0	1
Greece	4	0	4	Syria	2	1	3
India	1	0	1	Turkey	1	0	1
Ireland	39	26	65	West Indies	0	1	1
Italy	18	7	25				
				Totals	343	379	722



TABLE 6.—*Residence of Patients Admitted*

Abington . . . . .	2	Fitchburg . . . . .	20	Medway . . . . .	2	Revere . . . . .	1
Adams . . . . .	2	Foxborough . . . . .	5	Methuen . . . . .	2	Salem . . . . .	4
Agawam . . . . .	2	Framingham . . . . .	5	Middleborough . . . . .	6	Saugus . . . . .	1
Amesbury . . . . .	3	Franklin . . . . .	9	Middleton . . . . .	1	Seekonk . . . . .	1
Arlington . . . . .	1	Freetown . . . . .	1	Milford . . . . .	7	Shrewsbury . . . . .	1
Athol . . . . .	6	Gardner . . . . .	10	Milbury . . . . .	1	Somerville . . . . .	10
Attleboro . . . . .	14	Georgetown . . . . .	2	Millis . . . . .	1	Southbridge . . . . .	1
Auburn . . . . .	1	Gloucester . . . . .	1	Millville . . . . .	1	Springfield . . . . .	20
Barnstable . . . . .	1	Grafton . . . . .	1	Milton . . . . .	2	Stockbridge . . . . .	1
Belchertown . . . . .	1	Granby . . . . .	2	Montague . . . . .	3	Stonham . . . . .	1
Bellingham . . . . .	5	Great Barrington . . . . .	2	Natick . . . . .	1	Stoughton . . . . .	1
Billerica . . . . .	1	Greenfield . . . . .	1	New Bedford . . . . .	18	Swampscott . . . . .	1
Blackstone . . . . .	2	Halifax . . . . .	2	Newburyport . . . . .	3	Taunton . . . . .	39
Boston . . . . .	113	Hanover . . . . .	1	Newton . . . . .	1	Tewksbury . . . . .	1
Bridgewater . . . . .	1	Hanson . . . . .	2	Norfolk . . . . .	4	Uxbridge . . . . .	2
Brockton . . . . .	16	Harwich . . . . .	1	North Adams . . . . .	7	Walpole . . . . .	10
Brookline . . . . .	3	Hatfield . . . . .	1	North Andover . . . . .	1	Waltham . . . . .	4
Cambridge . . . . .	9	Haverhill . . . . .	5	No. Attleborough . . . . .	17	Ware . . . . .	2
Canton . . . . .	3	Holden . . . . .	1	North Reading . . . . .	1	Wareham . . . . .	1
Charlton . . . . .	2	Holliston . . . . .	3	Northbridge . . . . .	1	Webster . . . . .	4
Chelsea . . . . .	5	Holyoke . . . . .	4	Northfield . . . . .	2	West Newbury . . . . .	1
Chicopee . . . . .	4	Hopedale . . . . .	1	Norton . . . . .	4	West Springfield . . . . .	1
Clarksburg . . . . .	1	Hudson . . . . .	1	Norwood . . . . .	8	Westborough . . . . .	1
Cohasset . . . . .	1	Lawrence . . . . .	17	Oxford . . . . .	1	Westfield . . . . .	1
Colrain . . . . .	1	Lee . . . . .	2	Palmer . . . . .	2	Westport . . . . .	1
Dartmouth . . . . .	1	Leominster . . . . .	3	Peabody . . . . .	1	Weymouth . . . . .	1
Dedham . . . . .	6	Lowell . . . . .	22	Pembroke . . . . .	3	Whitman . . . . .	3
Deerfield . . . . .	1	Ludlow . . . . .	1	Pepperell . . . . .	1	Winchendon . . . . .	5
Dighton . . . . .	1	Lynn . . . . .	16	Pittsfield . . . . .	4	Winthrop . . . . .	2
Dudley . . . . .	1	Malden . . . . .	4	Plainville . . . . .	2	Woburn . . . . .	1
East Bridgewater . . . . .	1	Mansfield . . . . .	10	Plymouth . . . . .	1	Worcester . . . . .	16
Eastham . . . . .	1	Marblehead . . . . .	1	Quincy . . . . .	6	Wrentham . . . . .	10
Easton . . . . .	2	Marlborough . . . . .	4	Randolph . . . . .	3	Norway, Maine . . . . .	1
Everett . . . . .	2	Medfield . . . . .	1	Raynham . . . . .	2	N. Smithfield, R. I. . . . .	1
Fall River . . . . .	15	Medford . . . . .	3	Reading . . . . .	1	State Institutions . . . . .	51
Falmouth . . . . .	3						

TABLE 8.—*Stage of Disease of Patients Admitted*

	Males	Females	Totals
Early . . . . .	70	144	214
Moderately advanced . . . . .	124	136	260
Advanced . . . . .	149	99	248
Totals . . . . .	343	379	722

TABLE 9.—*Condition of Patients Discharged*

	Males	Females	Totals
Same . . . . .	93	101	194
Improved . . . . .	221	336	557
Totals . . . . .	314	437	751

TABLE 10

This table includes all new cases treated, both house patients and out-patients. In some instances, the same patient has been counted twice or more times, according to the varying conditions presented.

	Males	Females	Totals		Males	Females	Totals
<b>CARCINOMA:</b>				<b>Respiratory System:</b>			
Breast . . . . .	2	103	105	Bronchi . . . . .	1	—	1
Buccal Cavity and Pharynx:				Larynx . . . . .	5	1	6
Buccal mucosa . . . . .	13	2	15	Lung . . . . .	2	—	2
Cheek . . . . .	1	—	1	Naso-pharynx . . . . .	3	—	3
Floor of mouth . . . . .	22	1	23		11	1	12
Lip . . . . .	32	2	34				
Palate . . . . .	3	1	4	<b>Female Genital Organs:</b>			
Pharynx . . . . .	1	1	2	Cervix . . . . .	—	65	65
Tongue . . . . .	20	1	21	Ovary . . . . .	—	15	15
Tonsil . . . . .	4	—	4	Uterus . . . . .	—	14	14
	96	8	104	Vulva . . . . .	—	5	5
<b>Digestive Tract and Peritoneum:</b>					—	99	99
Anus . . . . .	2	—	2				
Appendix . . . . .	1	—	1	<b>Male Genito-Urinary Organs:</b>			
Bile duct . . . . .	2	—	2	Bladder . . . . .	11	—	11
Cecum . . . . .	1	1	2	Kidney . . . . .	2	—	2
Colon . . . . .	3	3	6	Penis . . . . .	4	—	4
Esophagus . . . . .	17	3	20	Prostate . . . . .	28	—	28
Intestines . . . . .	—	1	1	Scrotum . . . . .	3	—	3
Liver . . . . .	1	—	1	Testicle . . . . .	2	—	2
Pancreas . . . . .	6	2	8		50	—	50
Rectum . . . . .	32	17	49				
Sigmoid . . . . .	4	9	13				
Stomach . . . . .	34	11	45				
	103	47	150				

TABLE 10—Concluded

	Males	Females	Totals		Males	Females	Totals
Skin:				Hemangiomas . . . . .	9	14	23
Ear . . . . .	5	1	6	Lipomas . . . . .	7	10	17
Eyelid . . . . .	6	2	8	Papillomas . . . . .	14	17	31
Face . . . . .	37	17	54	Polyps . . . . .	5	23	33
Nose . . . . .	18	9	27	Other non-malignant			
Scalp . . . . .	1	2	3	tumors . . . . .	16	32	48
Temple . . . . .	1	-	1		58	186	244
Miscellaneous . . . . .	14	9	23				
	82	40	122	RHEUMATIC DISEASES,			
Other or Unspecified				NUTRITIONAL DISEASES,			
Organs:				ETC . . . . .	12	30	42
Antrum . . . . .	3	-	3	DISEASES OF THE BLOOD			
Axilla (metastatic,				AND BLOOD-MAKING			
primary focus un-				ORGANS . . . . .	14	5	19
known) . . . . .	-	1	1	DISEASES OF THE NER-			
Bladder (female) . . . . .	-	5	5	VOUS SYSTEM AND OR-			
Groin (metastatic,				GANS OF SPECIAL SENSE:			
primary focus un-				Nervous system . . . . .	6	15	21
known) . . . . .	1	-	1	Organs of vision . . . . .	3	2	5
Leg (metastatic,				Ear and mastoid pro-			
primary focus un-				cess . . . . .	3	1	4
known) . . . . .	2	-	2		12	18	30
Neck (primary focus				DISEASES OF THE CIR-			
unknown) . . . . .	8	1	9	CULATORY SYSTEM:			
Parotid . . . . .	3	-	3	Circulatory system			
Thyroid . . . . .	3	2	5	(general) . . . . .	79	63	142
	20	9	29	Lymphatic system . . . . .	2	2	4
LYMPHOBLASTOMA	9	8	17		81	65	146
SARCOMA.				DISEASES OF THE RES-			
Chondrosarcoma:				PIRATORY SYSTEM:			
Buttocks . . . . .	1	-	1	Nasal fossa and annexa			
Ilium . . . . .	2	-	2	Bronchus . . . . .	4	2	6
Fibrosarcoma:				Lungs . . . . .	57	12	69
Arm . . . . .	1	-	1	Pleura . . . . .	12	5	17
Back . . . . .	-	1	1		77	23	100
Cervix . . . . .	-	1	1	DISEASES OF THE DIGES-			
Leg . . . . .	-	1	1	TIVE SYSTEM:			
Toe . . . . .	-	1	1	Buccal cavity and an-			
Neurogenic fibrosar-				nexa, pharynx, and			
coma (arising in				tonsils . . . . .	18	12	30
neurofibromatosis)				Esophagus . . . . .	2	1	3
Osteogenic Sarcoma:				Ulcer of stomach and			
Femur . . . . .	1	1	2	duodenum . . . . .	32	19	51
Maxilla . . . . .	-	1	1	Stomach . . . . .	4	7	11
Pubic bone . . . . .	1	-	1	Intestines:			
Spine . . . . .	1	-	1	Diverticulitis . . . . .	2	6	8
Tibia . . . . .	3	-	3	Constipation . . . . .	5	14	19
Xanthosarcoma:				Other diseases . . . . .	26	32	58
Wrist . . . . .	1	-	1	Liver . . . . .	12	3	15
	12	6	18	Gall bladder and biliary			
AMELANOTIC MALIGNANT				passages . . . . .	11	42	53
MELANOMAS:				Pancreas . . . . .	3	1	4
Neck . . . . .	1	-	1	Peritoneum . . . . .	8	10	18
Heel . . . . .	1	-	1		123	147	270
	2	-	2	DISEASES OF THE GENITO-			
MALIGNANT MELANOMA:				URINARY SYSTEM:			
Back . . . . .	-	1	1	Kidneys and ureters . . . . .	37	27	64
Behind right ear . . . . .	1	-	1	Bladder . . . . .	6	5	11
Eye . . . . .	-	1	1	Urethra, urinary ab-			
Face . . . . .	-	1	1	scess, etc. . . . .	3	2	5
Groin . . . . .	-	1	1	Prostate . . . . .	23	-	23
Heel . . . . .	1	-	1	Male genital organs . . . . .	5	-	5
Knee . . . . .	1	-	1	Female genital organs . . . . .	-	147	147
Leg . . . . .	1	1	2	Breast . . . . .	-	39	39
Liver . . . . .	-	1	1		74	220	294
Shoulder . . . . .	1	-	1	DISEASES OF THE SKIN			
Thigh . . . . .	-	1	1	AND CELLULAR TISSUE:			
	5	7	12	Keratosis . . . . .	41	34	75
OTHER MALIGNANCY . . . . .	10	7	17	Sebaceous cysts . . . . .	4	5	9
NON-MALIGNANT TUMORS:				Verruca . . . . .	2	12	14
Adenomas . . . . .	1	7	8	Other diseases . . . . .	17	16	33
Adenofibromas . . . . .	-	14	14		64	67	131
Angiomas . . . . .	1	3	4	DISEASES OF THE BONES			
Fibroids . . . . .	-	51	51	AND ORGANS OF LOCO-			
Fibromas . . . . .	5	10	15	MOTION . . . . .	3	4	7
				OTHER CONDITIONS . . . . .	58	57	115
				No DISEASE . . . . .	12	15	27
				No DIAGNOSIS . . . . .	7	20	27

Financial Report, Pondville Hospital at Norfolk, 1932

To the Department of Public Health:

I respectfully submit the following report of the finances of this Institution for the fiscal year ending November 30, 1932.

STATEMENT OF EARNINGS

Board of patients:		
Private	\$19,659 61	
Cities and towns	55,385 00	\$75,044 61
Personal services:		
Reimbursement from Board of Retirement		61 35
Sales:		
Food	\$156 67	
Furnishings and household supplies	50	
Garage, stable and grounds	76 30	
Miscellaneous: junk	29 59	
Board of special nurses	238 63	
Total sales		501 69
Miscellaneous:		
Interest on bank balances	\$56 53	
Rents	40 00	
Total miscellaneous		96 53
Total earnings for the year		\$75,704 18
Total cash receipts reverting and transferred to the State Treasurer		\$60,182 39
Accounts Receivable outstanding Dec. 1, 1931	\$64,208 06	
Accounts Receivable outstanding Nov. 30, 1932	79,729 85	
Accounts Receivable increased		15,521 79

MAINTENANCE APPROPRIATION

Balance from previous year, brought forward		\$11,219 66
Appropriation, current year:		
Radium	\$10,000 00	
Other Maintenance	230,000 00	
Total		240,000 00
Total		\$251,219 66
Expenditures as follows:		
Personal services	\$133,746 93	
Food	30,980 47	
Medical and general care	17,989 30	
Heat, light and power	11,899 34	
Garage, stable and grounds	1,534 27	
Travel, transportation and office expenses	8,039 63	
Religious instruction	1,200 00	
Clothing and materials	383 95	
Furnishings and household supplies	13,859 41	
Repairs, ordinary	1,758 71	
Repairs and renewals	10,634 43	
Radium	8,807 18	
Total Maintenance Expenditures		\$240,833 62
Balance of Maintenance Appropriation, Nov. 30, 1932		10,386 04
Estimated Outstanding Liabilities, Nov. 30, 1932		\$1,933 12

SPECIAL APPROPRIATIONS

Balance December 1, 1931, brought forward		\$11,438 38
Appropriations for current year		
Total		\$11,438 38
Expended during the year (see statement below)	\$7,725 41	
Reverting to Treasury of Commonwealth	*1,418 37	
(Star balances below that are reverting)		
		9,143 78
Balance November 30, 1932, carried to next year		\$2,294 60

APPROPRIATION	Act or Resolve	Total Amount Ap- propriated	Expended during Fiscal Year	Total Expended to Date	Balance at End of Year
Hospital unit and out-patient de- partment	146-1929 115-1930	\$109,500 00	\$260 09	\$109,400 78	\$99 22*
Additional fire protection	127-1928 146-1929	17,000 00	-	16,980 89	19 11*
Recreation building	115-1930	7,000 00	6 57	5,699 96	1,300 04*
New filter beds	245-1931	10,000 00	7,458 75	7,705 40	2,294 60
		\$143,500 00	\$7,725 41	\$139,787 03	\$3,712 97



## PER CAPITA

During the year the average number of patients has been . . . . .		114.168
Total cost of maintenance . . . . .	\$240,833 62	
Equal to a weekly per capita cost of (52 weeks to year) . . . . .	40 73	
Total receipts for the year . . . . .	60,182 39	
Equal to a weekly per capita of . . . . .	10 13	
Total net cost of maintenance for year (total maintenance less total receipts) . . . . .		\$180,651 23
Net weekly per capita . . . . .	30 60	

Respectfully submitted,

MARION MACKENZIE,

*Treasurer.*

## Inventory: Pondville Hospital at Norfolk

## GRAND SUMMARY SHEET

November 30, 1932

## REAL ESTATE

Land, 324.2 acres . . . . .	\$54,836 28	
Buildings . . . . .	485,979 84	
Betterments (additions and improvements) . . . . .	18,093 18	
		\$558,909 30
Less 5% depreciation on buildings . . . . .		24,298 99
		<u>\$534,610 31</u>

## PERSONAL PROPERTY UNDISTRIBUTED SUPPLIES

Travel, transportation and office expenses . . . . .	\$1,229 87	
Food . . . . .	2,262 40	
Clothing and materials . . . . .	661 15	
Furnishings and household supplies . . . . .	3,051 81	
Medical and general care . . . . .	21,143 95	
Heat, light and power . . . . .	4,330 98	
Garage, stable and grounds . . . . .	134 32	
Repairs . . . . .	6,887 20	
		<u>\$39,701 68</u>

## PERSONAL PROPERTY DISTRIBUTED SUPPLIES

Travel, transportation and office expenses . . . . .	\$4,584 55	
Clothing and materials . . . . .	915 07	
Furnishings and household supplies . . . . .	52,119 39	
Medical and general care . . . . .	50,248 02	
Garage, stable and grounds . . . . .	7,806 60	
Repairs . . . . .	4,158 69	
		<u>\$119,832 32</u>
Less 5% depreciation . . . . .	5,991 62	
		<u>\$113,840 70</u>

## GRAND SUMMARY

Real Estate — Total . . . . .	\$534,610 31	
Personal Property — Undistributed Supplies, Total . . . . .	39,701 68	
Personal Property—Distributed Supplies, Total . . . . .	113,840 70	
Radium (in vault of emanation plant) . . . . .	69,880 30	
		<u>\$758,032 99</u>
Grand Total . . . . .		

## REPORT OF THE DIVISION OF WATER AND SEWAGE LABORATORIES

H. W. CLARK, *Director and Chief Chemist*

This Division, consisting of laboratories in the State House and the Lawrence Experiment Station and its laboratories, carried on its usual volume of analytical and research work during the year 1932. The results of practically all the chemical analyses made by this Division of public water supplies, rivers, sewage applied to and the effluents from municipal sewage disposal areas, industrial wastes, etc., are summarized in tables presented in the report of the Division of Sanitary Engineering. Besides the analytical work a large amount of research work and field work was done in connection with water supplies, water purification, condition of rivers, industrial waste disposal, shellfish purification, swimming pools, sudden deaths from carbon monoxide, etc. As usual a large part of this field work was in connection with the work of the Engineering Division and the results were included in their reports and replies.

The great variety of research and analytical work carried on by this Division necessitated the making of many chemical analyses having little relationship to either sewage or water. For example, in connection with the investigation of the industrial plants in Everett and Chelsea, 183 samples from these plants were analyzed, these analyses being largely of sulphur compounds produced by the operation of these plants, and many determinations were also made of the degree of pollution of the air in the vicinity of these plants. Other examples of such analytical work are included in the following summary, and a resumé of some of the research work of this Division is given on following pages:

### STATE HOUSE LABORATORIES

#### Samples from public water supplies:

Surface waters . . . . .	2,546
Ground waters . . . . .	1,613
Samples from domestic wells, ice supplies, swimming pools . . . . .	377
Samples from rivers . . . . .	1,326
Samples from sewage disposal works:	
Sewages . . . . .	632
Effluents . . . . .	421
Samples of wastes and effluents from factories . . . . .	41
Samples of sea water . . . . .	30
Miscellaneous samples (partial analyses) . . . . .	148
Special examinations of water (including field work) for manganese, lead, copper, arsenic, oil, alkalinity, fats, dissolved oxygen, carbonic acid, hydrogen ion . . . . .	3,113
Mineral analyses and gas analyses . . . . .	2
Microscopical examinations . . . . .	2,709
Chapter 40, Resolves of 1932:	
Analyses of effluents for oil, alkalinity, $H_2S$ , $SO_2$ , odor . . . . .	35
Analyses of acid sludge fuel oil for total S, $H_2O$ , total $H_2SO_4$ . . . . .	21
Analysis of gas scrubblings . . . . .	1
Analyses of crude oil for total sulphur . . . . .	4
Analyses of samples from treatment processes for odor, reaction with $I_2$ and NaOH, total sulphur, $H_2S$ , mercaptans, disulphides, sulphides, thiophenes, and other sulphur compounds . . . . .	120
Examination of sample of oil for inflammability . . . . .	1
Examination of sample of water for starch and alcohol . . . . .	1
Examination of sample of cotton waste for oil, etc. . . . .	1
Examination of sample of "Bitumastic" for odor imparted to Metropolitan water . . . . .	1

## LAWRENCE EXPERIMENT STATION

Chemical examinations on account of investigations concerning the disposal of domestic sewage and factory wastes, filtration and other treatment of water supplies, swimming pools, and the investigation of the Merrimack and other rivers	1,679
Mechanical and chemical examinations of sands	90
Bacterial examinations of water supplies, rivers, sewages and filter effluents, ice, swimming pools, wastes, etc.	5,433
Bacterial examinations in connection with methods of purification of sewage and water	603
Bacterial examinations of shellfish and sea waters	1,458

During the year 1,085 samples of shellfish and 373 samples of sea water were examined. Included in this are 486 samples of shellfish for the Food and Drug Division and twenty-two appearances were made in court in connection with prosecutions concerning polluted shellfish. In this shellfish work it has always been noted that quahaugs show a much lower *B. coli* content than soft clams from the same area and laboratory experiments have demonstrated that they have the power to remove *B. coli* from polluted sea water without showing a corresponding increase in the *B. coli* of the shell water.

A large volume of work was accomplished by the chemists of this Division during the last six months of the year concerning the operation of certain large industrial establishments in the cities of Everett and Chelsea and the processes involved in producing certain chemicals, oils, gasoline, etc., etc. The production of odors by these plants and nuisances caused by these odors in the territory surrounding them was the cause of this investigation. The field work, laboratory and research work involved are described in House Document No. 1171, 1932.

During the year two applications for advice caused lengthy investigations to be made in regard to the disposal of wastes from a tannery now polluting the Aberjona River, and of wastes from the manufacture of illuminating gas.

In sewage treatment very interesting and valuable experimental work was done concerning the operation of the activated sludge process by both compressed air and agitation. The latter method appears to be growing in favor and first-hand information was desired in regard to it. In trickling filter purification of sewage, studies were made of the relative value of aëration or chlorination before application of sewage to such filters.

The operation of household septic tanks was continued and further studies made upon sludge digestion under aërobic conditions, that is, by a well-nitrified effluent from a sand filter purifying sewage. Biochemical oxygen demand and relative stability work upon effluents, etc., gave certain needed information. In water purification further illuminating results were obtained from studies of storage, and the operation of the filters supplying water to the city of Lawrence was carefully checked by many bacterial and chemical examinations of the applied water and effluents. Further studies were also made of rates of flow, loss of head, etc., of water when passing through sand and other materials used for the purification of sewage and water.

## FILTRATION OF TANNERY WASTES

Wastes from the Lord Tannery at Woburn consist mostly of beam-house wastes containing much caustic lime and little, if any, spent tan liquors. When the study of these wastes was begun in July, copperas was being added to the waste after a preliminary settling. This caused some clarification and reduced the caustic alkalinity. When precipitation was stopped, the caustic alkalinity increased so that at times it was as high as 1,000 parts per million. This was so high that when the liquid was applied to a trickling filter (to be described later) nitrification stopped immediately and satisfactory purification was impossible. The waste from then on was carbonated until the caustic alkalinity was around 100 parts per million. As in most industrial plants, the strength of the wastes is not constant. There is a wide variation in the alkalinity but this is somewhat smoothed out by the preliminary settling tank.

Two sand filters containing  $3\frac{1}{2}$  feet of sand of an effective size of .25 millimeter



were started at the Experiment Station. To one, No. 611, wastes low in caustic lime, averaging 71 parts per million, were applied at a rate of 50,000 gallons per acre daily; to the other, No. 612, waste, averaging 211 parts caustic alkalinity, was applied at the same rate. After about seven months, Filter No. 612 became clogged by calcium carbonate precipitated in the sand. As nitrification and oxidation of the organic matter takes place in the filter, free carbon dioxide is formed. This reacts with any calcium hydroxide present to form calcium carbonate and if there is any excess carbon dioxide, some bicarbonate will be dissolved and carried out in the effluent.

Assuming that the alkalinity of the waste is due to lime and that the nitrate in the effluent is present as calcium nitrate, a rough calculation shows that the caustic alkalinity of the waste applied to Filter No. 611 was insufficient to combine with the nitric acid formed and that in addition, alkalinity equivalent to 87 parts per million calcium carbonate or bicarbonate was necessary. This means that there would be no accumulation of calcium carbonate under these conditions. A similar calculation for Filter No. 612 shows, on the other hand, 122 parts per million of calcium hydroxide was precipitated as calcium carbonate. The average caustic alkalinity of 211 parts per million in the applied waste was apparently somewhat unfavorable for nitrification, although the filter probably could have continued to operate if it had not been for the clogging due to precipitated calcium carbonate. The results of these two filters show that if the caustic alkalinity of the waste is reduced to below 100 parts per million by chemical precipitation with copperas or by carbonation, the waste can be satisfactorily purified by filtration through sand at rates of at least 50,000 gallons per acre daily.

The large area of sand beds that would be required made the use of trickling filters more practical. A small trickling filter, 10 feet deep and containing stone from one of the Station sewage filters, was started at the Experiment Station with this tannery waste. The rate at the start was 500,000 gallons per acre daily but was gradually increased to 1,500,000. This is probably around the maximum rate at which a good effluent can be obtained continuously. The effluent, even at the high rate, has been stable, clear and with comparatively little sediment. Apparently, a trickling filter can handle waste with higher caustic alkalinity than a sand filter. Probably carbonation takes place more readily and due to the greater depth there is a greater proportion of the filter which very likely receives no caustic alkalinity at all. Nevertheless, fairly complete carbonation is desirable to reduce to a minimum the amount of calcium carbonate which will be precipitated on the stone.

*Average Analyses*  
(Parts per Million)

	Color	AMMONIA			Chlorine	NITROGEN AS		Oxygen Consumed	ALKALINITY	
		Free	Total	In Solution		Nitrates	Nitrites		Methyl Orange	Phenolphthalein
Settled tannery waste	—	69.5	29.4	22.8	3167	—	—	133.0	899	770
Wastes applied to Trickling Filter No. 613	—	63.3	29.4	23.0	3938	—	—	161.0	735	500
Effluent	77	43.0	4.2	2.9	3600	28.7	.639	16.9	167	0
Wastes applied to Sand Filter No. 611	—	67.2	15.3	12.3	3200	—	—	98.	262	71
Effluent	29	22.8	.6	—	3458	51.0	.432	3.4	14	0
Wastes applied to Sand Filter No. 612	—	48.5	19.0	16.2	3467	—	—	98.	331	211
Effluent	33	38.6	.8	—	3121	25.9	12.800	7.3	88	21

*Average Solids*  
*Settled Tannery Waste*  
(Parts per Million)

UNFILTERED			FILTERED			IN SUSPENSION		
Total	Loss on Ignition	Fixed	Total	Loss on Ignition	Fixed	Total	Loss on Ignition	Fixed
7475	1021	6454	7064	769	6295	411	252	159

## WASTE LIQUORS FROM THE MANUFACTURE OF ILLUMINATING GAS

In the manufacture of illuminating gas there are always troublesome wastes produced. In this State many gas plants are so located that these wastes are disposed of by dilution in streams or tide-water without any particular nuisance being caused but there are many exceptions to this and wastes are passed to brooks, rivers, etc., and are the source of nuisances and complaints. There are two general types of these wastes, one consists of the watery liquid from the oil and tar separator, and the other is the residue from the ammonia still and contains phenols, thiocyanates, etc. There is a small amount of oily tar in the first waste which is readily removed by strainers of sand, sawdust, etc.

During 1932, experiments were made with the wastes from a municipal gas plant, the wastes from which consisted of about 11,000 gallons of oil and tar separator liquor and 7,000 gallons of the ammonia-still liquor. The still liquor is the real problem in disposal as it contains from .3 to 1 per cent of organic matter and, as stated, phenols, etc. The other waste is comparatively weak. Chemical precipitation is of little value in the treatment of the ammonia-still wastes and the mixed wastes are too strong for direct filtration and contain so much phenol, etc., that they will not support bacterial life. The only alternative is to add them to city sewage and purify them mixed with this sewage and this is done successfully at many places in England. The one requirement is that the wastes must enter the sewers at a uniform rate or preferably at a rate proportional to the flow of sewage. In this instance, the volume of the mixed wastes was approximately .67 per cent of the volume of domestic sewage.

Two small filters containing  $3\frac{1}{2}$  feet of sand of an effective size of .25 millimeter were started March 1 at the Experiment Station to study sand filtration of these wastes. The first filter, No. 591, was operated as a control at a rate of 50,000 gallons per acre daily with Lawrence sewage. The second filter, No. 592, received, at the same rate, Lawrence sewage to which increasing proportions of the mixed gas waste were added. The amount was gradually increased from three-fourths of a per cent to 2 per cent on September 14. This was nearly three times the necessary amount, if the mixed waste and domestic sewage of the municipality in question was to be purified on the same filter, yet the filter handled this mixture satisfactorily. The reason for increasing the amount of waste gradually was that it is well known that a filter can handle a much larger proportion of an injurious substance if it becomes slowly accustomed to it.

From September 14 ammonia-still liquor alone was used and the amount at first was .25 per cent of the volume of domestic sewage but was increased to 1 per cent by November 7. This proportion of waste was nearly four times the necessary amount yet did not interfere with the operation of the filter. This amount of waste could probably be somewhat increased but at the risk of a slightly poorer effluent. Some experiments in regard to the efficiency of trickling filters in the treatment of gas plant wastes have been started but are not far enough advanced as yet to give the results.

## Average Analyses

## Settled Lawrence Sewage applied to Filter No. 591

(Parts per Million)

Color	AMMONIA			Chlorine	NITROGEN AS		Oxygen Consumed
	Free	ALBUMINOID			Nitrates	Nitrites	
		Total	In Solution				
—	54.90	6.80	4.20	82	—	—	33.7
<i>Effluent from Filter No. 591</i>							
26	1.27	.40	—	80	47.4	.216	4.5
<i>Settled Lawrence Sewage and Mixed Gas-House Liquor applied to Filter No. 592</i>							
—	74.00	8.80	5.50	84	—	—	56.3
<i>Effluent from Filter No. 592</i>							
36	14.14	.50	—	81	51.2	.330	5.7
<i>Settled Lawrence Sewage and Gas-House Ammonia-Still Liquor applied to Filter No. 592</i>							
—	51.70	6.20	3.70	92	—	—	58.0
<i>Effluent from Filter No. 592</i>							
26	4.34	.42	—	84	47.9	.025	4.0

*Wastes from a Municipal Gas Light Company*

(Parts per Million)

EFFLUENT FROM	SOLIDS						AMMONIA			Oxygen Consumed	Tar
	UNFILTERED			FILTERED			Free	ALBUMINOID			
	Total	Loss on Ig-nition	Fixed	Total	Loss on Ig-nition	Fixed		Total	In Solution		
Oil and tar separator	1441	1322	119	304	191	113	37.9	2.0	1.5	4.53	1005
Ammonia still . . .	5930	5864	66	5511	5469	42	1184.0	168.0	113.0	6085	-

CHARACTER OF THE SEWAGE USED FOR INVESTIGATIONS UPON SEWAGE PURIFICATION  
AT THE LAWRENCE EXPERIMENT STATION

The sewage for the various filters, pumped to the Experiment Station through about 1,850 feet of pipe, is a fairly strong domestic sewage free from trade wastes and the coarser suspended matter is excluded by a strainer on the end of the pipe in the sewer.

The following tables present the average analyses of sewage used during the year. "Regular sewage" is the sewage as pumped to the Station; "settled sewage" is the same sewage after passing through Imhoff Tank No. 545 and receiving a slight additional settling in a large tank used for supplying all the filters at the Station, except Nos. 1, 4 and 9A which receive the effluent of Imhoff Tank No. 545.

## IMHOFF TANK

One Imhoff tank was operated during the year. It is of concrete, 20 feet deep, with a settling compartment 7 feet 4 inches long by 1 foot wide and with gas vents 1 foot square at each end. The bottom of the settling compartment has a slope of 45 degrees towards the center where there is a slot opening. The digestion compartment has a capacity of 357 gallons; the settling compartment, 715 gallons, giving a theoretical storage of about one and one-half hours during the seven to eight hours that the sewage is being pumped. Settleable solids were removed during the year at the rate of 882 pounds dry matter per million gallons of sewage. The digested sludge as drawn monthly was entirely inoffensive, black in color, contained an average of 5.6 per cent dry matter and had a pH of around 7.0. The average composition of the dry sludge was,—fats, 12.6 per cent; nitrogen, 3.68 per cent; loss on ignition, 55.7 per cent. One hundred and sixty-eight pounds of dry matter were withdrawn and 690 pounds were added. This tank would undoubtedly digest a much larger amount of fresh solids if they were available. Judging from laboratory experiments, Lawrence sludge as collected at the Station is more readily digested and is less subject to acid conditions than sludges containing more vegetable matter, such as enter most large Imhoff installations.

*Average Analyses**Regular Sewage*

(Parts per Million)

Free	AMMONIA		KJELDAHL NITROGEN		Chlorine	Oxygen Consumed	Fats	Bacteria per Cubic Centimeter
	Total	In Solution	Total	In Solution				
54.2	10.5	7.0	18.8	13.4	77	53.4	48	3,500,000

*Sewage After Passing Through Imhoff Tank No. 545*

53.5	7.9	5.1	13.8	9.2	78	43.5	44	2,300,000
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*Settled Sewage*

52.8	6.3	4.0	10.9	7.5	77	32.0	24	2,350,000
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## Average Solids

## Regular Sewage

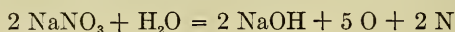
(Parts per Million)

UNFILTERED			FILTERED			IN SUSPENSION		
Total	Loss on Ignition	Fixed	Total	Loss on Ignition	Fixed	Total	Loss on Ignition	Fixed
647	346	301	459	223	236	188	123	65
<i>Sewage after Passing Through Imhoff Tank No. 545</i>								
537	284	253	455	222	233	82	62	20
<i>Settled Sewage</i>								
526	262	264	442	204	238	84	58	26

## DIGESTION OF SLUDGE WITH NITRIFIED EFFLUENT FROM A SEWAGE FILTER

For the past four years the sludge collected from a settling tank at the Station has been digested in Tank No. 483 with a well nitrified effluent of a sand filter receiving sewage. This work is a repetition of similar work done in 1913-1916, inclusive. The tank consists of three compartments, 20 inches in diameter and 6 feet deep but only two compartments are used at present. The effluent is applied continuously at the bottom of the first compartment and passes from the top to the bottom of the second and then overflows. Sludge is collected three times weekly, settled, and applied for four weeks to one compartment of Tank No. 483, hence the maximum storage is four weeks although part of the sludge receives much less than this. In 1931 the digestion period was six weeks and in 1930 eighteen, but the four-week period has been found to give practically as good results as the longer ones. The digested sludge is inoffensive, compares favorably with sludge from good Imhoff tanks and the liquid passing away from the tank has no offensive odor.

The digestion process is a combination of anaerobic and aerobic action. Some methane is formed from the anaerobic process and on the other hand much oxygen is absorbed from the nitrates of the filter effluent as it passes through the tank. The sludge before digestion contained 75 per cent organic matter, 3.80 per cent nitrogen, 23.4 per cent fats; and after digestion, 56 per cent organic matter, 3.49 per cent nitrogen and 10.3 per cent fats. The volume of effluent applied to Tank No. 483 averaged 12.6 gallons for each gallon of sludge containing about .6 per cent dry matter. The average nitrates in the applied filter effluent was 26.4 per cent per million and in the effluent of the tank, 7.7 parts per million. The addition of nitrates to the digesting sludge, besides furnishing available oxygen, supplies alkalinity to correct any acid tendencies, according to the reaction,—



The caustic soda immediately combines with free carbon dioxide which is formed by the action of the oxygen on the carbonaceous matter of the sludge. The effluent of the tank is less likely to promote growths of microorganisms than the effluent entering the tank as it has a much smaller nitrate content.

## Average Analyses

## Effluent from Sand Filter applied to Sludge Digestion Tank No. 483

(Parts per Million)

UNFILTERED			FILTERED			AMMONIA			NITROGEN AS	
Total	Loss on Ignition	Fixed	Total	Loss on Ignition	Fixed	Free	ALBUMINOID	In Solution	Ni- trates	Ni- trites
-	-	-	-	-	-	4.92	.78	.57	26.4	.246
<i>Effluent from Sludge Digestion Tank No. 483</i>										
379	124	255	357	107	250	17.71	1.38	.94	7.7	.702

OPERATION OF HOUSEHOLD SEPTIC TANKS

Two small septic tanks of concrete construction, Nos. 507 and 508, have been operated at the Station since June, 1920. The first is 4 feet long, 2 feet wide and 40 inches deep, with a sloping bottom and a capacity of 185 gallons; the second contains two compartments of the same size as the first and has a capacity of 370 gallons. Sewage enters each tank through trapped inlets and discharges through a pipe reaching 15 inches below the surface of the sewage in the tank. A baffle is placed one-third of the distance from the inlet to the outlet and reaches to within 8 inches of the bottom of the tank. The first tank receives practically fresh household sewage and the second, Lawrence sewage, a comparatively stale sewage. Both tanks are so operated that theoretically the sewage is held within each for two days; that is, the sewage added daily is equal to one-half the capacity of the tanks, disregarding the effect of the accumulated sludge. During most of the entire period of operation, the effluents from both tanks have been remarkably clear and comparatively odorless. Both tanks have been opened for observation and sludge measurements eight times since 1920, and the results have been given in previous reports. The sludge from both tanks has been practically odorless and inoffensive, resembling good Imhoff sludge in appearance and analysis; in fact, these tanks behave more like Imhoff tanks than the usual septic tank. Measurements of the volume of sludge when the tanks were opened for examination, and calculations showing the percentage of the organic matter deposited in the tanks that had been destroyed from the time the tanks were started up to the time of each examination, are shown in a following table. In August, 1927, the tanks, having become about two-thirds full of sludge, all but six inches in depth was removed. Samples of sludge collected late in 1932 from No. 507 contained on a dry basis 3.16 per cent, nitrogen; 7.5 per cent, fats, and 50.6 per cent, organic matter; from No. 508, 2.63 per cent, nitrogen; 6.8 per cent, fats and 43.8 per cent, organic matter.

In previous reports attention has been called to the reduction of soluble albuminoid ammonia in the sewage passing through these tanks; in 1932, the reduction was 62 per cent in No. 507 and 64 per cent in No. 508. The reduction in B.O.D. was also remarkable,—in No. 507, 65 per cent, and in No. 508, 75 per cent.

YEAR	Per Cent of Tank Filled with Sludge			Per Cent of Organic Matter Destroyed since Start*	
	No. 507	No. 508-1	No. 508-2	No. 507	No. 508
1921 . . . . .	26	28	20	41	62
1922 . . . . .	35	27	27	66	66
1924 . . . . .	33	33	33	78	83
1926 . . . . .	60	60	38	69	68
1927** . . . . .	66	66	66	73	77
1928 . . . . .	15	15	15	—	—
1929 . . . . .	59	62	41	46	49
1932 . . . . .	70	70	35	72	75

\*1929 and 1932 figures refer to operation since tanks were emptied.  
\*\*All except 15 per cent removed at end of 1927.

Average Analyses  
Fresh Sewage applied to Closed Septic Tank No. 507  
(Parts per Million)

Free	AMMONIA		KJELDAHL NITROGEN		Chlorine	Oxygen Consumed	Fats	Bacteria per Cubic Centimeter
	ALBUMINOID							
	Total	In Solution	Total	In Solution				
97.3	21.3	11.1	37.3	19.6	86	113.0	102	4,550,000
Effluent from Closed Septic Tank No. 507								
100.2	7.5	4.3	12.8	8.1	80	45.5	27	1,370,000
Regular Sewage applied to Closed Septic Tank No. 508								
55.5	9.8	6.7	19.0	12.0	78	49.7	54	1,550,000
Effluent from Closed Septic Tank No. 508								
63.7	3.4	2.4	6.4	4.5	79	26.4	32	713,000

*Average Solids*  
*Fresh Sewage applied to Closed Septic Tank No. 507*

(Parts per Million)

UNFILTERED			FILTERED			IN SUSPENSION		
Total	Loss on Ignition	Fixed	Total	Loss on Ignition	Fixed	Total	Loss on Ignition	Fixed
912	584	328	526	308	218	386	276	110
<i>Effluent from Closed Septic Tank No. 507</i>								
557	205	352	468	139	329	89	66	23
<i>Regular Sewage applied to Closed Septic Tank No. 508</i>								
583	290	293	414	179	235	169	111	58
<i>Effluent from Closed Septic Tank No. 508</i>								
417	141	276	352	93	259	65	48	17

ACTIVATED SLUDGE

*Tank No. 485 operated with Compressed Air.—Tank No. 590 by Agitation*

Experiments on the aeration of sewage have been carried on at the Lawrence Experiment Station continuously since 1911, and descriptions and results of this work have been published in the annual reports of the Department. Activated sludge Tank No. 485, started in 1917, is still in operation and consists of three compartments 75 inches deep, each holding 230 gallons. The overflow from the last one, comprising the purified sewage and considerable sludge, passes through two settling tanks with capacities of 600 and 160 gallons, respectively, allowing about five and one-half hours' sedimentation during which the activated sludge settles out and is then pumped back to the first compartment. Air is applied at the bottom of each compartment through a filtros plate clamped to the top of an iron box at a rate approximating .33 cubic feet of air per hour per gallon of sewage. The tank is operated at the rate of 7,433,000 gallons per acre daily on the basis of the aerating and settling tanks, or 13,150,000 gallons on the basis of the activating tanks alone. It has been the custom to retain about 20 per cent by volume of sludge in the tank, the excess being pumped to waste from time to time.

Most of the sludge in Tank No. 485 and Tank No. 590 was lost in the fire at the Experiment Station (1931) and to build up a new supply as quickly as possible, sludge from Imhoff Tank No. 545 was added every few days for about two weeks, with constant aeration and the addition of sodium nitrate. In about ten days, a sludge was obtained that would settle readily and was similar to our usual activated sludge except that it was darker in color. After about a month, nitrification was well established and normal operation was resumed. Sufficient sludge was conditioned in Tank No. 485 to supply Tank No. 590. No figures of surplus sludge are available for 1932. The sludge from the Imhoff tank contained on the dry basis, 3.94 per cent, nitrogen, and 9.6 per cent, fats; after about six weeks' aeration in activated sludge Tank No. 485 it contained 5.66 per cent, nitrogen and 3.9 per cent, fats.

In all the various aeration tanks at the Experiment Station until 1931 aeration had been obtained by compressed air but at a number of places in this country and abroad aeration by mechanical means has been carried on successfully. There is yet no agreement as to which method is more efficient and economical. In 1931 a small tank was put in operation at the Station to study mechanical aeration. This tank, No. 590, is of concrete, of an effective depth of 7 feet 9 inches and is 3 feet by 4 feet at the top, but one side slopes at such an angle 15 inches from the top that the tank is only 4 feet by 6 inches at the bottom. Built on one side of the tank at the top is a circular compartment or trough of 6-inch radius, in which a close fitting paddle revolves at 60 revolutions a minute. A slot, 2 inches wide and 4 feet long, is built in the side of the tank and connects the bottom of the tank with the bottom of the trough. When the paddle is revolved, the sewage in the trough is thrown over a low dividing wall into the main tank and is well distributed over its surface. As the liquid is thrown from the trough, more comes up from the bottom of the tank through the slot and circulation of the sewage is continuous. Tank



No. 590 is operated at the same rate as Tank No. 485 and has a similar arrangement of settling tanks and sludge return. The settled effluent of each has contained an average of 6.2 parts per million of dissolved oxygen and has been similar in appearance, clear and bright, with a very small amount of suspended matter. Chemical analyses of their effluents are also similar except less nitrification is obtained in Tank No. 590. During the year both effluents had relative stabilities of 99 per cent but the effluent of Tank No. 590 was slightly lower in B.O.D. So far as these results go, there is little to choose between the two methods of aeration and agitation.

#### Average Analyses

#### *Sewage applied to Activated Sludge Tank No. 485 and Mechanically Aerated Activated Sludge Tank No. 590*

(Parts per Million)

APPEARANCE		AMMONIA ALBUMINOID			KJELDAHL NITROGEN		Chlorine	NITROGEN AS		Oxygen Consumed	Bacteria per Cubic Centimeter
Turbidity	Color	Free	Total	In Solution	Total	In Solution		Nitrates	Nitrites		
-	-	54.5	7.8	4.6	14.8	8.7	80	-	-	46.3	2,350,000
<i>Effluent from Activated Sludge Tank No. 485</i>											
3	49	20.5	2.2	1.4	4.3	2.6	77	15.8	.526	14.6	400,000
<i>Effluent from Mechanically Aerated Activated Sludge Tank No. 590</i>											
4	56	31.1	1.9	1.4	3.3	2.5	84	2.2	.725	12.6	696,000

#### Average Solids

#### *Sewage applied to Activated Sludge Tank No. 485 and Mechanically Aerated Activated Sludge Tank No. 590*

(Parts per Million)

UNFILTERED			FILTERED			IN SUSPENSION		
Total	Loss on Ignition	Fixed	Total	Loss on Ignition	Fixed	Total	Loss on Ignition	Fixed
562	274	288	405	167	238	157	107	50
<i>Effluent from Activated Sludge Tank No. 485</i>								
417	167	250	398	151	247	19	16	3
<i>Effluent from Mechanically Aerated Activated Sludge Tank No. 590</i>								
404	100	304	385	92	293	19	8	11

#### TRICKLING FILTERS

#### *Preliminary Treatment of Sewage by Chlorination or Aeration*

Trickling filters have been operated at the Experiment Station since 1890 and many different phases of this method of purification have been investigated such as size, depth and kind of material, rates, etc.

During 1932 special attention was paid to the relative merits of partial chlorination and of aeration as preliminary treatments and the degree of purification taking place at different depths in trickling filters was also studied. Three filters, Nos. 571, 572 and 573 were put in operation July 1, 1929, and are identical in construction, being 1/20,000 of an acre in area and containing 10 feet in depth of crushed stone that will pass a 1½-inch screen and be retained by a ¾-inch screen. The average rate of operation of each filter is 1,533,000 gallons per acre daily. At depths of 4, 6 and 8 feet, half-round sections of ¾-inch iron pipe are inserted to the center of the filters to collect small portions of the effluent. Of these three filters, No. 571 was run as a control while No. 572 received sewage which had received 10 parts per million of chlorine as calcium hypochlorite and had been allowed to stand one hour before beginning application to the filter. Frequent tests showed that all free chlorine had disappeared during this period and while the reduction of bacteria varied apparently inversely as the strength of the sewage, the sewage was never

sterile. The number of bacteria in samples collected at various depths and in the final effluent of the filter was generally lower than in the effluent of the other two filters but higher than in the applied sewage after chlorine treatment. Before chlorination, the average B.O.D. of the sewage was 269 and after chlorination 234 parts per million. This reduction of the B.O.D. of the applied sewage did not aid the operation of the filter. The sewage applied to Filter No. 573 was aerated and the average dissolved oxygen present when applied was 4.8 parts per million.

The results so far obtained indicate that the use of chlorine as a preliminary treatment appears to be of little or no value although a longer period of experiment may prove otherwise. The addition of 4.8 parts per million of dissolved oxygen by aeration to the sewage applied to Filter No. 573 produced a final effluent considerably better purified than that of the control filter or the one receiving chlorine as a preliminary treatment. Preliminary aeration of the sewage is really equivalent to adding to the depth of a filter as in the average trickling filter the main purpose of the upper portion of filter material is to aerate the sewage so that aerobic purification may proceed.

The purification taking place at different depths in the three filters as shown by nitrification, reduction of B.O.D. and reduction of soluble albuminoid ammonia is irregular. There is no explanation for this but probably these irregularities will be smoothed out over a sufficiently long period of operation. The results do show that purification at varying rates is taking place throughout the filters.

A fourth filter, No. 578, of the same depth and construction as Filters Nos. 571 to 573, inclusive, received sewage from the first compartment of activated sludge Tank No. 485 which had been aerated about one hour and forty minutes and then settled. The average rate of operation of this filter was 3,684,000 gallons per acre daily as compared with the 1,533,000 rate of Filters No. 571, 572 and 573. The amount of purification received in this way is almost too great to be classed as a preliminary treatment and the rate of this filter can undoubtedly be increased above that of 1932.

Eight other trickling filters were operated with sewage and one with a tannery waste during the year. The oldest, No. 135, is constructed of 10 feet in depth of crushed stone all of which will pass a  $1\frac{1}{2}$ -inch screen and be retained by a  $\frac{3}{4}$ -inch screen and has been in operation thirty-three years. Filters Nos. 452 to 455, inclusive, contain 4, 6, 8 and 10 feet, respectively, of crushed stone that will pass a  $1\frac{1}{2}$ -inch screen and be retained by a  $\frac{3}{4}$ -inch screen. Filters Nos. 473 to 475, inclusive, contain 6, 8 and 10 feet, respectively, of coarser stone, passing a  $2\frac{1}{2}$ -inch screen and retained by a  $1\frac{1}{2}$ -inch screen.

These two sets of filters gave effluents of 99 per cent relative stability which shows that the deeper filters can handle relatively greater volumes of sewage than the shallower ones. The B.O.D., especially, shows the value of the greater depth and also the greater purification due to the smaller stone in Filters Nos. 453 to 455, inclusive, compared with Filters Nos. 473 to 475, inclusive. (See page 212.)

The following table shows the amount of nitrification for each foot of material between the various outlets.

		(Parts per Million)		
DEPTH		NITROGEN AS NITRATES PER FOOT OF FILTER DEPTH		
		Filter No. 571	Filter No. 572	Filter No. 573
Surface to 4 feet . . . . .		2.57	.60	2.62
4 feet to 6 feet . . . . .		.75	3 15	3.45
6 feet to 8 feet . . . . .		4.55	2.85	5.60
8 feet to 10 feet . . . . .		.40	3 .00	1.15

This second table shows the decrease in soluble albuminoid ammonia, also a measure of purification, at the same depths.

		(Parts per Million)		
DEPTH		REMOVAL OF SOLUBLE ALBUMINOID AMMONIA BY THE FILTERING MATERIAL AT DIFFERENT DEPTHS		
		Filter No. 571	Filter No. 572	Filter No. 573
Surface to 4 feet . . . . .		.80	.80	.40
4 feet to 6 feet . . . . .		.40	.50	1.00
6 feet to 8 feet . . . . .		.60	.00	.90
8 feet to 10 feet . . . . .		.00	.80	.00

Average Analyses

Effluents from Trickling Filters Nos. 135, 452, 453, 454, 455, 473, 474 and 475

(Parts per Million)

FILTER NUMBER	Quantity Applied — Gallons per Acre Daily	AMMONIA			Kjeldahl Nitrogen	Chlorine	NITROGEN AS —		OXYGEN Consumed	Bacteria per Cubic Centimeter
		Free	ALBUMINOID				Nitrates	Nitrites		
			Total	In So- lution						
135	1,381,000	18.7	3.2	1.9	6.1	78	23.1	.250	21.6	220,000
452	563,000	24.8	5.9	3.4	10.6	78	15.2	.700	31.7	482,000
453	609,000	23.3	3.8	2.5	7.8	80	14.9	1.220	25.1	530,000
454	1,600,000	26.7	3.7	2.2	7.2	79	12.7	1.250	23.3	608,000
455	3,682,000	20.3	3.8	2.2	7.3	78	14.7	.820	22.9	284,000
473	371,000	16.8	5.1	2.8	9.0	80	14.6	.847	30.1	598,000
474	1,172,000	30.2	4.7	2.9	9.2	79	11.6	1.550	24.5	664,000
475	2,374,000	23.7	4.0	2.5	7.0	78	15.9	1.190	21.2	562,000

Average Solids

Effluents from Trickling Filters Nos. 135, 452, 453, 454, 455, 473, 474 and 475

(Parts per Million)

FILTER NUMBER	UNFILTERED			FILTERED			IN SUSPENSION		
	Total	Loss on Ignition	Fixed	Total	Loss on Ignition	Fixed	Total	Loss on Ignition	Fixed
135	548	248	300	483	216	267	65	32	33
452	573	254	319	447	194	253	126	60	66
453	486	208	278	447	175	272	39	33	6
454	453	187	266	408	149	259	45	38	7
455	498	217	281	431	173	258	67	44	23
473	521	245	276	463	217	246	58	28	30
474	453	183	270	397	145	252	56	38	18
475	474	192	282	417	159	258	57	33	24

Average Analyses

Effluents from Trickling Filters No. 571, 572 and 573 collected at Different Depths

Filter No. 571

(Parts per Million)

Depth (Feet)	AMMONIA			Kjeldahl Nitrogen	Chlorine	NITROGEN AS —		Oxygen con- sumed	Bacteria per Cubic Centi- meter
	Free	ALBUMINOID				Nitrates	Nitrites		
		Total	In Solu- tion						
4	30.8	4.5	3.2	8.2	94	10.3	.600	28.6	1,170,000
6	31.0	4.7	2.8	8.3	91	11.8	.650	32.3	793,000
8	19.5	4.1	2.2	7.1	91	20.9	.500	26.6	367,000
10	24.0	4.7	2.2	8.5	91	21.7	.575	29.7	710,000

Filter No. 572

4	36.0	5.4	3.2	9.6	115	2.4	.425	29.6	784,000*
6	29.8	5.4	2.7	10.0	113	8.7	.475	29.9	450,000
8	28.0	5.6	2.7	9.7	114	14.4	.525	30.2	428,000
10	21.5	4.4	1.9	8.4	113	20.4	.450	28.8	261,000

Filter No. 573

4	26.5	6.3	3.6	10.9	94	10.5	.775	32.3	1,650,000
6	17.8	4.8	2.6	9.1	92	17.4	.750	30.8	1,320,000
8	11.8	3.8	1.7	6.7	90	28.6	.400	26.7	730,000
10	15.3	4.1	1.7	7.5	90	30.9	.400	27.7	803,000

\*Bacteria per cubic centimeter in the chlorinated sewage applied to Filter No. 572 averaged 116,000.

Average Analyses

Sewage applied to and Effluents from Trickling Filter No. 578

(Parts per Million)

FILTER NUMBER	AMMONIA			Kjeldahl Nitrogen		Chlorine	NITROGEN AS		Oxygen Consumed	Bacteria per Cubic Centimeter
	Free	ALBUMINOID		Total	In Solution		Nitrates	Nitrites		
		Total	In Solution							
Applied, . . .	29.7	4.6	2.5	7.9	4.6	81	9.2	.634	25.5	817,000
Effluent, . . .	17.7	4.3	2.1	8.2	-	79	12.8	.560	28.2	625,000



*Average Solids*  
*Sewage applied to and Effluent from Trickling Filter No. 578*  
(Parts per Million)

	UNFILTERED			FILTERED			IN SUSPENSION		
	Total	Loss on Ignition	Fixed	Total	Loss on Ignition	Fixed	Total	Loss on Ignition	Fixed
Applied . . .	473	195	278	392	138	254	81	57	24
Effluent . . .	512	192	320	463	166	297	49	26	23

OPERATION OF CONTACT FILTERS

Only one contact filter, No. 175, is now in operation as a study of the permanency of this type of filter and as an example of this method of sewage purification. It was put in operation in 1901, is 1/20,000 of an acre in area and contains 39 inches in depth of coke passing a 1-inch screen and retained on a 1/4-inch screen. During 1932 the filter was operated one five-hour cycle daily with sewage which had passed through an Imhoff tank and received a small amount of settling in a storage supply tank. It was allowed to rest one week six times during the year. Since 1901 it has been necessary to remove and wash the filtering material twice,—once in 1911 and again in 1920. The open space of the filter material has decreased 29 per cent in ten years.

*Average Analyses*  
*Effluent from Contact Filter No. 175*  
(Parts per Million)

QUANTITY APPLIED	Free	AMMONIA ALBUMINOID		Kjeldahl Nitrogen	Chlorine	NITROGEN AS		Oxygen Consumed	Bacteria per Cubic Centimeter
		Total	In Solution			Nitrates	Nitrites		
Gallons per Acre Daily									
294,000	11.2	2.9	1.9	5.5	78	14.1	.363	17.3	550,000

*Average Solids*  
*Effluent from Contact Filter No. 175*  
(Parts per Million)

UNFILTERED			FILTERED			IN SUSPENSION		
Total	Loss on Ignition	Fixed	Total	Loss on Ignition	Fixed	Total	Loss on Ignition	Fixed
458	187	271	421	165	256	37	22	15

INTERMITTENT SAND FILTERS. — ACIDITY OF EFFLUENTS.—STUDIES OF  
OVERDOSING

*Filters Nos. 1, 5, 9A, 593, 594, 595, 596, 597, 598, 599, and 600*

Filters Nos. 1, 4 and 9A are each 1/200 of an acre in area and at the end of 1932 Nos. 1 and 4 had been operated forty-five years and No. 9A, forty-two years. For the past seven years, the sewage applied to them has passed through an Imhoff tank where some suspended solids are removed. These three filters contain 5 feet in depth of sand of an effective size of .48, .04 and .17 millimeter, respectively, and during the year they were operated at average rates of 47,300, 19,300 and 47,500 gallons per acre daily, respectively. The surface of Filters Nos. 1 and 9A are trenched and ridged late in the fall, while the surface of Filter No. 4 is permanently arranged in circular trenches 14 inches wide filled to a depth of 12 inches with sand of an effective size of .48 millimeter. Sewage is applied to the trenches of Filter No. 4 while grass is allowed to grow over the rest of the filter. The effluents of these filters have been quite acid for many years due to the fact that there is not enough alkali in the applied sewage to combine with the acid formed by nitrification in the filter. In the earlier years of operation this deficiency was made up by alkali extracted from the sand. During 1931 considerably more than the theoretical amount of soda ash necessary to neutralize the acidity of the effluents was added to the applied sewage and this reduced the acidity somewhat but did not completely neutralize it. During 1932 calcium hydroxide was added in amounts up to 500 parts per million without neutralization. Apparently much of this lime was

precipitated as calcium carbonate by free carbon dioxide in the upper portions of the filter and there was not present at that point enough more free carbon dioxide to redissolve much of it as bicarbonate. As the addition of alkali to the sewage during these two years was without apparent benefit, it was discontinued.

The success of an intermittent sand filter for sewage purification depends as the name indicates on its intermittent flooding. When sewage is applied to such a filter, some of the air in the open space throughout the sand escapes from the filter and as the sewage passes into the sand, air is drawn in after it. The air escaping from the filter has all or most of its oxygen used up in the filter in the process of oxidizing carbonaceous matters to carbon dioxide and the nitrogenous matter to nitrates and any method of operating such a filter which prevents the presence of oxygen in the interstices of the sand entirely changes the process from an aerobic, oxidizing one to a mechanical straining under anaerobic conditions with a gradual clogging of the filter. Unfortunately it is the practice at many of the sewage areas of the State to apply all of a day's flow of sewage upon a small proportion of the total number of beds or even one bed instead of distributing the sewage properly. As a result the beds become clogged, less sewage can be filtered and the effluents are poorly purified.

To once more show the effect of this method of operation a series of small sand filters has been started at the Experiment Station. They are 10 inches in diameter and contain 4 feet in depth of sand of an effective size of .25 millimeter. The average daily rate of each filter is 50,000 gallons per acre daily; Filter No. 593 is run as a control and flooded once daily; Filter No. 594 is flooded every two days; Filter No. 595, every three days; Filter No. 596, every four days; Filter No. 597, every five days and Filter No. 598, every six days. Two similar filters, No. 599 which receives a trickling filter effluent settled and operated at a rate of 100,000 gallons per acre daily and Filter No. 600 which is a duplicate of No. 593 except that 25 per cent of the filter material consists of stone between one and two inches in diameter, are in operation. The purpose of this last filter is to learn if it is necessary or advisable to screen this stone from sand used in sewage filters. Both of these filters are flooded daily but none has as yet been in operation for a long enough period to show definite results. The material in Filter No. 600 is somewhat similar to that in Filter No. 6 formerly in operation at the Station.

#### Average Analyses

##### Effluent from Filter No. 1

(Parts per Million)

TEMPERATURE (DEGREES F.)		AMMONIA		Chlorine	NITROGEN AS —		Oxygen Consumed	Alkalinity	Bacteria per Cubic Centimeter
Applied	Effluent	Free	Albumi- noid		Nitrates	Nitrites			

59	55	5.576	.562	61	29.6	.010	5.2	-6.0	25,900
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##### Effluent from Filter No. 4

58	53	.347	.223	71	36.8	.006	3.1	-13.0	1,500
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##### Effluent from Filter No. 9A

59	56	1.784	.336	56	23.3	.010	4.5	1.0	5,730
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#### Average Analyses

##### Effluents from Filters Nos. 593, 594, 595, 596, 597, 598, 599 and 600

(Parts per Million)

Filter Number	Color	Number of Days Between Flooding	AMMONIA		Chlorine	NITROGEN AS —		Oxygen Consumed
			Free	Albumi- noid		Nitrates	Nitrites	

593	11	1	.50	.295	89	63.0	.166	3.0
594	19	2	1.96	.609	90	53.3	.087	4.5
595	24	3	1.23	.604	91	58.2	.268	4.5
596	23	4	4.63	.774	85	61.1	1.000	6.0
597	23	5	4.32	.859	85	82.6	1.533	4.6
598	26	6	1.75	.908	90	67.8	.126	6.2
599	17	1	1.58	.363	91	47.6	.173	2.8
600	16	1	.31	.244	90	66.2	.036	2.7

## BIOCHEMICAL OXYGEN DEMAND AND RELATIVE STABILITY

B.O.D. determinations of the various sewages and effluents and relative stability determinations of the effluents were made during the year and the results are shown in a following table. The B.O.D. determination, as stated in previous reports, is not an exact determination; that is, the values obtained depend to a considerable extent on the volumes of the sample taken for the test and the uncontrolled action of bacteria. It is very different from the exactness of a chemical reaction or analysis. For tests of sewages, two dilutions were taken, usually 1 and 2 per cent, and the results averaged; for effluents, only one dilution was taken and it was intended to have at least 2 parts per million of dissolved oxygen present after incubation. In the sewage tests, the smaller amount taken (1 per cent) gave on an average, results 15 per cent higher than when 2 per cent was taken. The B.O.D. of effluents containing nitrates does not take into account the oxygen absorbed from the nitrates; on the other hand, in the relative stability test, the total oxygen, both dissolved and that available from nitrates and nitrites is used. Both tests give information about the oxygen absorbing properties of effluents but from slightly different angles.

## BIOCHEMICAL OXYGEN DEMAND OF RIVER WATER

The B.O.D. and dissolved oxygen of the Merrimack River were determined on five occasions from June to November, inclusive, at the same stations as during the three previous years. The results were very similar to those shown in the last report.

STATION	B.O.D. (Parts per Million)	Dissolved Oxygen Per Cent of Saturation
At Tyngsborough . . . . .	1.7	73.9
Above Lowell . . . . .	2.6	79.8
Below Lowell . . . . .	2.5	77.5
Above Lawrence . . . . .	2.7	80.7
Below Lawrence . . . . .	15.6	70.0
Above Haverhill . . . . .	6.8	60.5
At Groveland . . . . .	6.0	47.5
Above Amesbury . . . . .	4.4	66.6
Above Newburyport . . . . .	4.4	62.0

## AVERAGE RELATIVE STABILITIES AND AVERAGE B.O.D. OF FILTER EFFLUENTS

Filter Number	Relative Stability	B.O.D. (Parts per Million)	Filter Number	Relative Stability	B.O.D. (Parts per Million)
1	99	1.0	578*	99	41
4	99	1.2	578	99	26
9	99	0.8	571, 4 ft.	97	76
135	99	25.	6 "	99	65
175	83	31.	8 "	99	46
452	98	57.	10 "	99	42
453	99	58.	572, 4 "	62	72
454	99	52.	6 "	79	66
455	99	32.	8 "	99	38
473	99	61.	10 "	99	40
474	99	66.	573, 4 "	86	71
475	99	37.	6 "	99	64
485	99	27.	8 "	99	43
590	99	18.	10 "	99	39

\*Applied.

## AVERAGE B.O.D. OF SEWAGES

	B.O.D. (Parts per Million)
Regular sewage	412
Effluent from Imhoff Tank No. 545	273
Settled sewage	237
Sewage applied to Septic Tank No. 507	465
Effluent from Septic Tank No. 507	161
Sewage applied to Septic Tank No. 508	412
Effluent from Septic Tank No. 508	104

## PURIFICATION OF WATER BY STORAGE

The study of the effect of storage in water purification begun in 1930 has been continued. Two covered concrete tanks, 16 feet in diameter and holding 3 feet 9 inches in depth of water are used; a small door in each allows diffused light to enter during the warmer months but during the winter the doors are closed. The first



tank is divided by concrete walls into three sectors, one about twice as large as the other two. The second tank is divided into four equal sectors. These seven compartments are connected in series, the inlet in each case being at the bottom and the outlet near the top. River water is passed into the first compartment continuously and at such a rate that it is forty-five days passing through the two tanks. During the year this storage reduced the color of the water about 15 per cent, the B. coli of the river water 99.85 per cent and the 20°C. bacteria 94 percent; also during the year a sand filter, No. 577, was operated at a rate of 2,500,000 gallons per acre daily with the stored water, and a duplicate filter, No. 576, was operated with river water such as entered the storage tank. Both of these filters contain 4 feet in depth of sand of an effective size of .25 millimeter. Filtration of this clear, almost sterile, stored water, accomplished practically nothing so far as bacterial removal is concerned.

### Average Chemical Analyses

(Parts per Million)

	Color	AMMONIA ALBUMINOID			Chlorine	NITROGEN AS —		Oxygen Consumed	Hardness
		Free	Total	In Solu- tion		Nitrates	Nitrites		
Filter No. 577:									
Stored river water applied to	35	.030	.120	.109	3.1	.429	.003	4.1	23*
Effluent from	31	.016	.100	—	3.1	.485	.000	3.3	28*
Filter No. 576:									
Raw river water applied to	41	.143	.203	.163	3.7	.265	.008	4.4	14
Effluent from	26	.031	.090	—	3.7	.375	.006	3.2	13

\*Increased hardness due to use of concrete storage tanks.

### Average Bacterial Analyses

(Parts per Million)

	BACTERIA PER CUBIC CENTIMETER			B. Coli in 100 cc.
	4 Days 20°C.	24 Hrs.—37°C.		
		Total	Red	
River water before storage . . . . .	2,500	125	39	1,320
River water after 45 days' storage . . . . .	144	6	0	2
Effluent from Filter No. 577 . . . . .	63	4	0	2
Effluent from Filter No. 576 . . . . .	125	7	1	17

### LAWRENCE CITY FILTERS

As usual this report presents data in regard to the operation during the past year of the slow sand filters for the purification of the water supply of Lawrence. Lawrence has taken its water supply from the Merrimack River since 1875, and since 1893, it has been filtered. Since 1918 the filtered water has been treated with chlorine as an added factor of safety. Three filters are in use. The oldest, 2.2 acres in area, is divided into three sections, one of which is covered; the second, 0.75 of an acre in area, was built in 1907 and is also covered; the third filter, covered also, was completed early in 1926 and is 0.75 of an acre in area. The average volume of water filtered daily during 1932 was 4,315,000 gallons. Liquid chlorine was applied as a solution at the pump-well at the average rate of 1.41 parts per million. This amount of chlorine is very high compared with what is used in other localities, but has proved to be necessary. No attempt is made to maintain any definite residual chlorine. Daily bacterial samples are taken of the water after chlorination and the amount of chlorine to be added is governed by this. The chlorinated water is pumped direct to a storage reservoir holding about 41,500,000 gallons, from which the low service system is supplied. Any excess chlorine is taken care of by the reservoir. In 1931 a pump was installed to supply water for the high service from the reservoir. The bacterial efficiency of the various filters has averaged better than 99 per cent but the B. coli score, or number of B. coli in 100 cubic centimeters, is still higher than the two allowed by the U. S. Treasury standard but after chlorination, however, the average number is less than one. There has been some increase in the 20° bacteria count in the water of the storage reservoir, due partly to an "after-growth" following chlorination and partly to contamination by dust, etc.

## Average Bacterial Analyses

## Merrimack River — Intake of the Lawrence City Filters

BACTERIA PER CUBIC CENTIMETER			PER CENT OF BACTERIA REMOVED			PER CENT OF SAMPLES CONTAINING B. COLI					B. Coli in 100 cc.
4 Days 20°C.	24 Hrs.—37°C.		4 Days 20°C.	24 Hrs.—37°C.		.001 cc.	.01 cc.	0.1 cc.	1.0 cc.	10 cc.	
	Total	Red	Total	Total	Red						
8,400	360	127	—	—	—	0	44	99	100	100	5,100
<i>Effluent from the Lawrence City Filter (Old Filter, East Open Section)</i>											
51	4	1	99.4	98.9	99.2	0	0	0	6	13	6
<i>Effluent from the Lawrence City Filter (Old Filter, East Covered Section)</i>											
49	4	1	99.4	98.9	99.2	0	0	0	6	25	7
<i>Effluent from the Lawrence City Filter (Old Filter, West Open Section)</i>											
54	6	1	99.4	98.7	99.2	0	0	0	5	34	8
<i>Effluent from the Lawrence City Filter (North Filter)</i>											
55	4	1	99.3	98.9	99.2	0	0	1	14	52	28
<i>Mixed Effluents as pumped to the Distributing Reservoir after Chlorine Treatment</i>											
10	2	0	99.9	99.4	100.0	0	0	0	0	—*	—*
<i>Water from the Outlet of the Distributing Reservoir</i>											
98	29	0	98.8	91.9	100.0	0	0	0	0	8	—*
<i>Water from a Tap at Lawrence City Hall</i>											
97	10	0	98.8	97.2	100.0	0	0	0	0	4	—*
<i>Water from a Tap at the Lawrence Experiment Station</i>											
67	11	0	99.2	97.0	100.0	0	0	0	0	6	—*
<i>Water from a Tap on the High Service System</i>											
87	13	0	99.0	96.4	100.0	0	0	0	0	4	—*

\*Less than 1.

## Average Chemical Analyses

## Merrimack River—Intake of the Lawrence City Filters

(Parts per Million)

Temperature (Deg. F.)	APPEARANCE		AMMONIA			Chlorine	NITROGEN AS —		Oxygen Consumed	Iron	Hardness
	Turbidity	Color	Free	ALBUMINOID			Nitrates	Nitrites			
				Total	In So- lution						
51	15	40	.166	.230	.166	3.5	.163	.007	5.1	.762	14
Effluent from the Lawrence City Filter (Old East Filter)											
51	0	42	.189	.102	-	4.1	.339	.003	3.8	2.310	15
Effluent from the Lawrence City Filter (North Filter)											
51	0	32	.046	.107	-	3.8	.259	.001	3.7	.502	15
Water from the Outlet of the Distributing Reservoir											
52	0	39	.084	.103	-	5.4	.305	.001	3.3	1.400	15
Water from a Tap at Lawrence City Hall											
55	0	39	.056	.097	-	5.6	.362	.003	3.2	1.440	16
Water from a Tap at the Lawrence Experiment Station											
54	0	38	.043	.089	-	5.4	.339	.002	3.2	1.440	17

## AVERAGE SOLIDS

*Merrimack River—Intake of the Lawrence City Filters*  
(Parts per Million)

UNFILTERED			FILTERED			IN SUSPENSION		
Total	Loss on Ignition	Fixed	Total	Loss on Ignition	Fixed	Total	Loss on Ignition	Fixed
55.2	24.4	30.8	48.2	20.7	27.5	7.0	3.7	3.3
<i>Effluent from the Lawrence City Filter (Old East Filter)</i>								
52.8	21.2	31.6	-	-	-	-	-	-
<i>Effluent from the Lawrence City Filter (North Filter)</i>								
49.1	19.5	29.6	-	-	-	-	-	-
<i>Water from the Outlet of the Distributing Reservoir</i>								
53.7	20.7	33.0	-	-	-	-	-	-
<i>Water from a Tap at Lawrence City Hall</i>								
52.2	18.0	34.2	-	-	-	-	-	-
<i>Water from a Tap at the Lawrence Experiment Station</i>								
51.5	19.6	31.9	-	-	-	-	-	-

STUDIES OF LOSS OF HEAD AND MAXIMUM RATES OF FLOW OF WATER THROUGH  
SAND AND OTHER FILTERS

During the early work of the Experiment Station many researches were made concerning the value, in either water or sewage filtration, of sands of various grades, peat, garden soil, etc. Especial studies were made from time to time of the maximum rates of flow of water through these different materials and articles summarizing some of this work were published in the annual reports of the State Board of Health for 1892 and 1894. Moreover, in the annual report of the Experiment Station for 1892, page 458, a table is given showing with other data the effective size, so called, of many of these materials and the maximum rate of flow of water through them. During 1932, on account of certain questions now arising, considerable further work of this nature was carried on, largely in regard to the relation between the depth of filter, the loss of head and the maximum rate of flow allowed by different materials.

For the first study, three filters, 19 inches in diameter and containing 10, 6 and 2 feet, respectively, in depth of sand of an effective size of .26 millimeter and a uniformity coefficient of 3.1, were put in operation. Two feet of clear water was maintained over each filter and the rate kept at 2,500,000 gallons per acre daily, the loss of head being read each day. The water used was free from suspended matter hence any loss of head was due to air-binding in the filter. When the rate could no longer be maintained, the filters were slowly back-filled to expel air, and during seven months of operation it was necessary to back-fill the 10 foot filter three times; the 6-foot and 2-foot filters once each. The average loss of head for each filter for seven months was as follows: For the 10-foot filter, 2 feet 10½ inches; the 6-foot filter, 1 foot 7½ inches and for the 2-foot filter, 1 foot 1 inch. But these figures will probably change as the experiment is continued.

For studies of the maximum rates of certain very fine materials, filters 10 inches in diameter and 4 feet deep were put in operation, two feet of water being maintained over the sand. The material of the first filter, No. 603 is hardpan; that is, clay mixed with coarser material and its effective size is .04, millimeter and its uniformity coefficient, 4.9. The material of No. 604 is river silt, the effective size of which is .05 millimeter and the uniformity coefficient, 2.6. The material of No. 605 is a clayey gravel, somewhat similar to the material in No. 603 except that there is a greater proportion of coarse material. The effective size of this material is .05 and its uniformity coefficient, 11.5. The material of No. 606 is loam from a cultivated garden, with all roots and fibers screened out, and has an effective size of .04 millimeter and a uniformity coefficient of 6.2. These four materials, as will be noted, have nearly the same effective size but differ in uniformity coefficient, chemically and in other respects. The filters were operated with their outlets wide



open for three months in order to allow the material to settle and compact before making measurements of rates and the results of the next five month's operation are shown in the following table.

*Average Rate*  
(Gallons per Acre Daily)

Months after start	Filter No. 603	Filter No. 604	Filter No. 605	Filter No. 606
4	560,000	17,900,000	2,700,000	1,340,000
5	600,000	18,400,000	1,680,000	832,000
6	568,000	13,500,000	1,280,000	800,000
7	340,000	8,960,000	1,200,000	640,000
8	304,000	3,280,000	944,000	608,000

The decrease in rates is due largely to the compacting of each material. Undoubtedly the shape of the particles, which is not indicated by mechanical analysis, has much to do with compacting or closing up the open space of the material and hence increasing the resistance to the movement of water through these filters. Continuation of all this work is needed to obtain reliable data.

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